SEMINAR NO. FH3010

NOS OPERATOR

TRAINING

STUDENT HANDOUT

REVISION RECORD	
REVISION	DESCRIPTION
A	Manual Release.
(10-08-82)	
B	Manual Update. Upgrade from 2.0 to 2.1.5
(03-23-84)	
C	Manual Update. Upgrade to NOS Version 2.2
(02-01-84)	
D	Manual Update. Upgrade to NOS Version 2.3
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(04-30-86)	
F	Manual Update. Upgrade to NOS Version 2.5
(2/26/87)	
Publication No. FH3010-1	

REVISION LETTERS I, O, Q AND X ARE NOT USED

NOS OPERATOR TRAINING

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GENERAL COURSE DESCRIPTION

Course Title: Network Operating System Operator Training

Course Number: FH3010

Course Length: 5 days

Class Size: 12 Maximum

Course Description:

This is a two part lecture and laboratory course. Part I is designed to provide the student with a minimum level of operational knowledge. Part II is designed to supply advanced operations concepts for the Network Operating System.

Prerequisites:

Students attending this course should have a background in the following:

- Introduction to CYBER 170/NOS (course number FA3000) or equivalent experience.

Objectives:

To provide a working knowledge of the Network Operating System from an Operational viewpoint. In addition, the student will be able to do the following:

- Query the operating system for information.
- Respond to the information and error messages generated by the operating system.
- Manipulate the system and peripheral equipment via Dynamic System Display Commands.
- Complete a Level 0, 1, and 3 deadstart.

Objectives (cont):

- Complete an alternate device deadstart and an express deadstart dump.

- Use status communication lines.

- Take the system down in an orderly fashion.

Testing:

Exercises and quizzes will be used throughout the course as a means of identifying topics requiring further explanation and to determine student understanding of the material. Reviews of material covered will be conducted each day.

Practice:

A minimum of four hours lab time is included in the course. This time is meant to give students "hands-on" exposure to NOS and to allow more individualized training by the instructor.

NOS OPERATOR TRAINING

COURSE OUTLINE

1. Hardware Description

   A. Central processor features
   B. Central memory features
   C. Peripheral processor
   D. Input/Output
   E. Extended memory
   F. Quiz #1

2. System Flow

   A. Batch jobs
   B. Job execution
   C. Messages
   D. Interactive jobs

3. System Description

   A. System implementation
   B. Operating system components
   C. Subsystems
   D. Control point concept
   E. Quiz #2

4. Dynamic System Displays

   A. Keyboard
   B. Special keys
   C. Display overview
   D. Display headers and trailers
   E. Quiz #3
   F. Lab #1

5. Equipment Configuration

   A. Logical devices
   B. Channels and controls
   C. E,A. display
   D. System configuration
   E. Quiz #4

6. Mass Storage

   A. Family
   B. Permanent files
   C. Temporary files
   D. E,M. and E,C. display
   E. Quiz #5

7. Unit Record Devices

   A. I display
   B. Form code
   C. Logical ID
   D. Printer Support Utility (PSU)
   E. Lab #2

8. Job Processing

   A. Job processing control
   B. Scheduling control
   C. Batch priority
   D. Service classes
   E. B, S and Q displays

9. Tape Subsystem

   A. Deadlock
   B. Labeled and unlabeled tapes
   C. Tape assignment
   D. E,T. and E,P. displays
   E. Lab #3

10. Deadstart

    A. Description
    B. Panel
    C. Warmstart and coldstart
    D. Displays
    E. CHRDECK, EQPDECK, APRDECK, and IPRDECK
    F. System startup
    G. System shutdown
    H. Troubleshooting
    I. Lab #4

11. Utilities

    A. Permanent file
        1. Initial PFS displays
        2. DIS input
        3. Procedure files
        4. Catalog archive (PFATC)
        5. Catalog permanent file device (PFCAT)
        6. Copy archive file (PFCOPY)
        7. Dump permanent file (PFDUMP)
        8. Load permanent file (PFLOAD)

    B. Queue file
        1. Calling the queue utilities
        2. QDUMP
        3. QLOAD
        4. QREC
        5. QALTER/QTFLIST
        6. QMOVE

    C. Dayfile

        1. Selective dumping

12. Security

    A. Operating system mode
    B. Security level
    C. Security categories
    D. Equipment security

13. Network Commands

    A. Terms
    B. Network configuration
    C. Summary of control

14. Remote Host Facility

    A. Terms
    B. Loosely coupled network
    C. Configuration
    D. RHF applications

15. Special Displays/Utilities

    A. K display
        1. Initialize
        2. Redefine
        3. Transaction Facility

    B. L Display
        1. Family ordinal table
        2. Logical identifier table
        3. Queue display
        4. Service class type
        5. Subsystem

16. Display Operation (DIS) Commands

    A. Display selection
    B. Individual displays
    C. Special keys
    D. Control characters
    E. Keyboard messages
    F. Keyboard entries
    G. Memory entries

17. Ø26 Console Text Editor

    A. First character entries
    B. Messages
    C. System commands
    D. File commands
    E. Line entry and data moves
    F. Display, tab, scan control commands
    G. Line, record search
    H. Replace commands
    I. Miscellaneous commands
    J. Upper case carriage control
    K. Lab #5

COURSE CHART

<table>
<tr><th>HOUR</th><th>DAY 1</th><th>DAY 2</th><th>DAY 3</th><th>DAY 4</th><th>DAY 5</th></tr>
<tr><td>1</td><td>INTRODUCTION</td><td>REVIEW</td><td>REVIEW</td><td rowspan="2">UTILITIES</td><td rowspan="2">SECURITY</td></tr>
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<tr><td>3</td><td rowspan="2">SYSTEM FLOW</td><td>TAPE COMMANDS</td><td rowspan="2">SPECIAL DISPLAY UTILITIES</td></tr>
<tr><td rowspan="2">4</td><td>SYSTEM DESCRIPTION</td><td rowspan="3">DEADSTART</td></tr>
<tr><td rowspan="2">DYNAMIC SYSTEM DISPLAY</td><td rowspan="2">MASS STORAGE</td><td>DIS</td><td rowspan="4">LAB (OPTIONAL)</td></tr>
<tr><td rowspan="3">5</td><td rowspan="3">LAB</td><td rowspan="2">UNIT RECORD DEVICES</td><td rowspan="2">Ø26 CONSOLE TEXT EDITOR</td></tr>
<tr><td rowspan="2">LAB</td><td rowspan="2">LAB</td></tr>
<tr><td>6</td><td>LAB</td></tr>
</table>

LESSON 1

HARDWARE DESCRIPTION

LESSON 1

HARDWARE DESCRIPTION

Lesson Preface:

This lesson defines the hardware configuration. Both mainframe and peripheral equipment configurations are discussed.

Objectives:

After completion the student should be able to:

- Understand the configuration of the system.
- Be aware of the various types of configuration that are available.
- Understand the configuration that is available at this particular site.
- Describe major components of the system.

References:

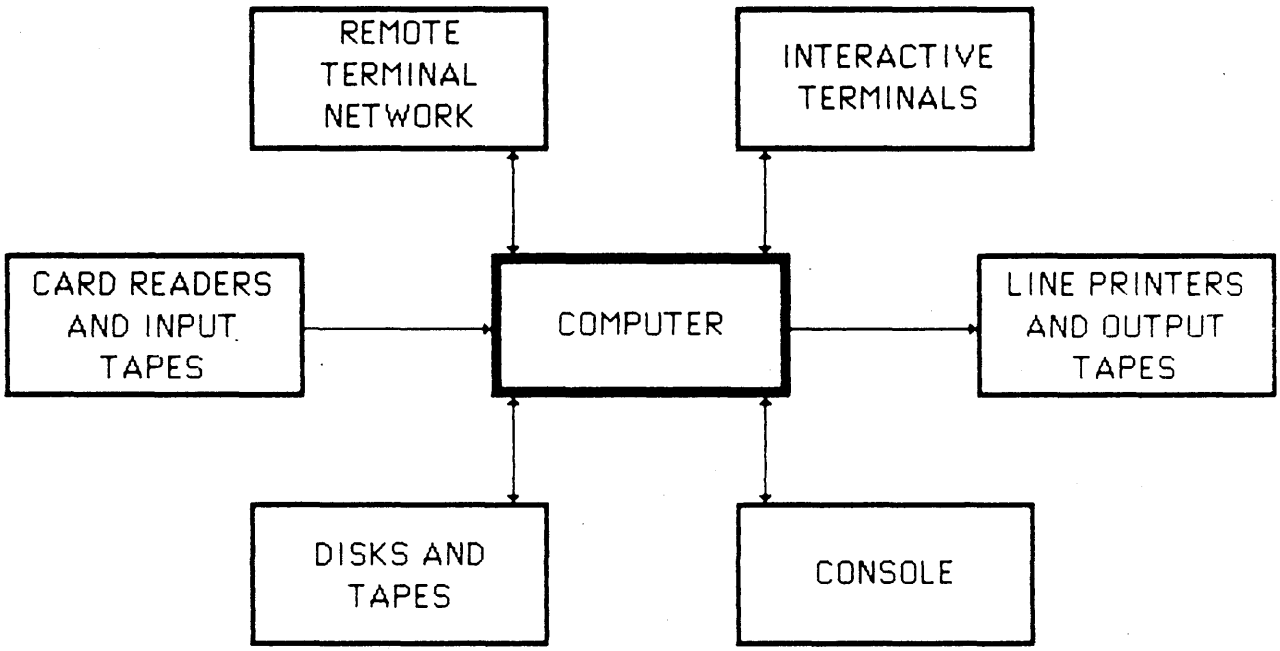
- Cyber 170-7X0 Hardware Reference Manual - Pub. No. 60456100
- Cyber 180-810, 830 Hardware Reference Manual - Pub. No. 60469420
- Cyber 170-815,825 Hardware Reference Manual - Pub. No. 60469350
- Cyber 170/180-835, 840, 845, 850, 855, 860 and CYBER 180 Model 990 Hardware Reference Manual - Pub. No. 60469290
- Cyber 170-865, 875 Hardware Reference Manual - Pub. No. 60458920

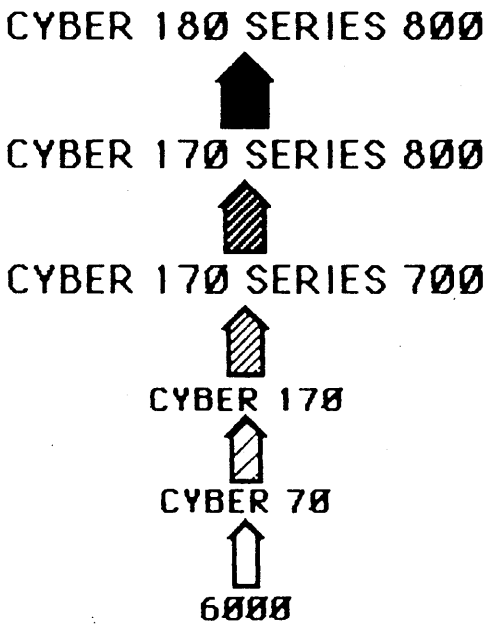
Projects:

- Quiz 1

OVERVIEW

OF A COMPUTER SYSTEM

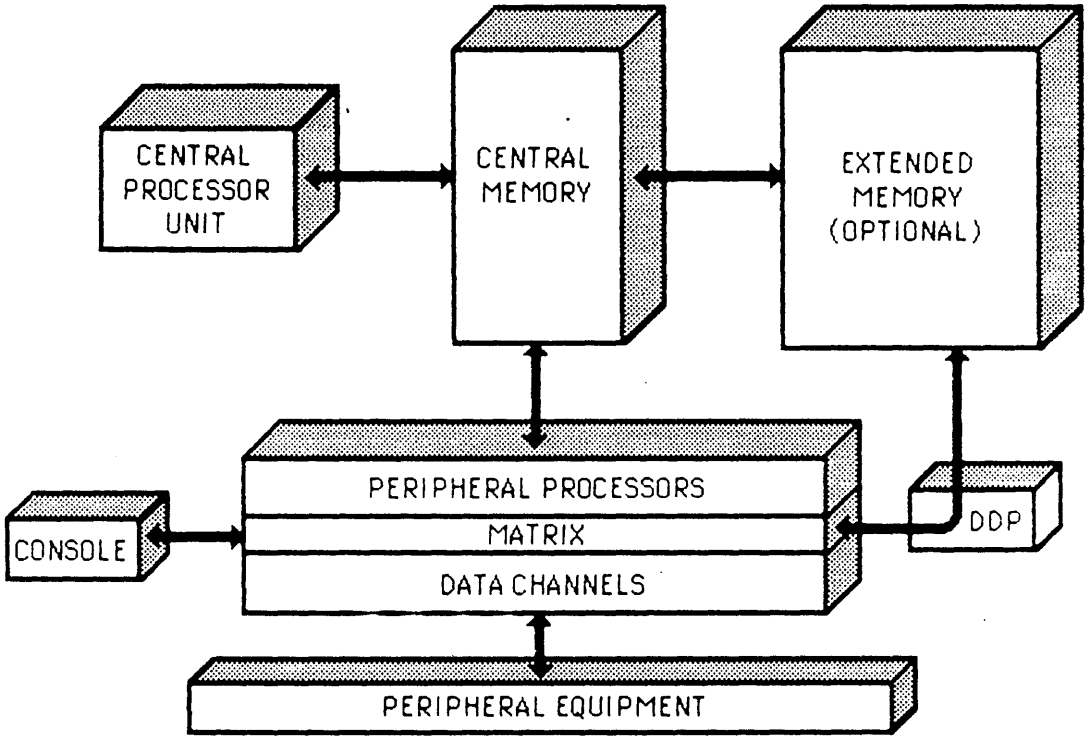




A NEW FAMILY WITH A PROUD HERITAGE

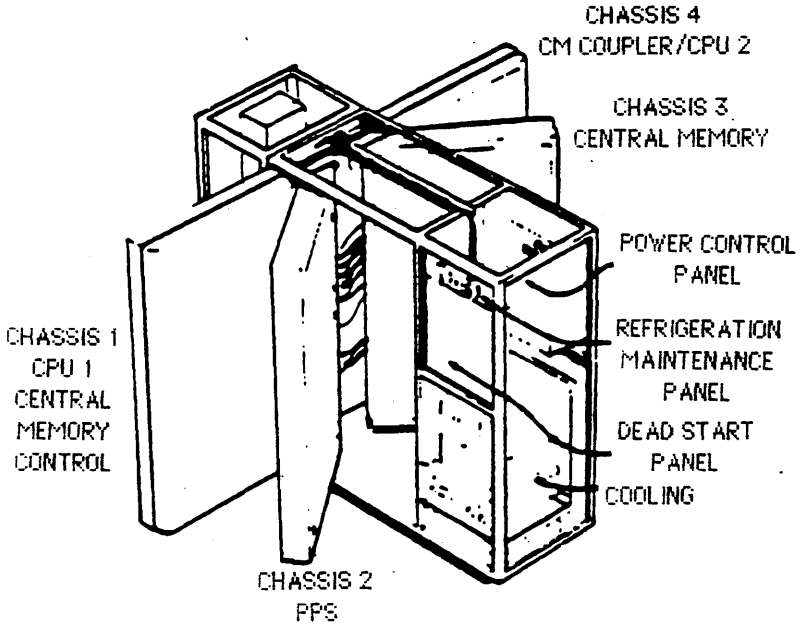
CYBER 170 SERIES

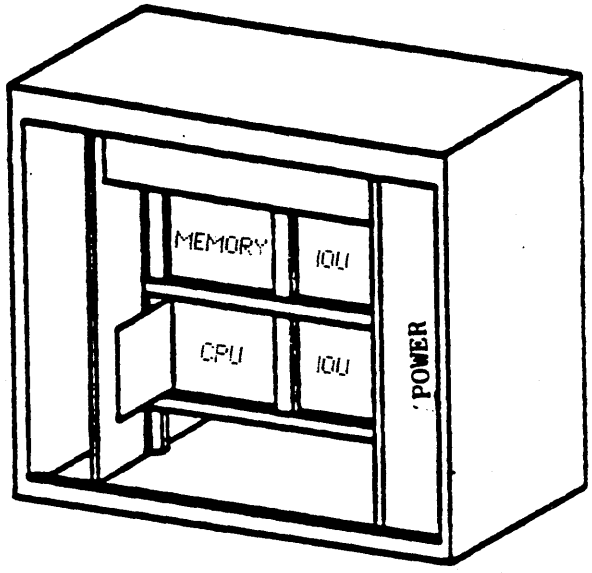
700,865 AND 875



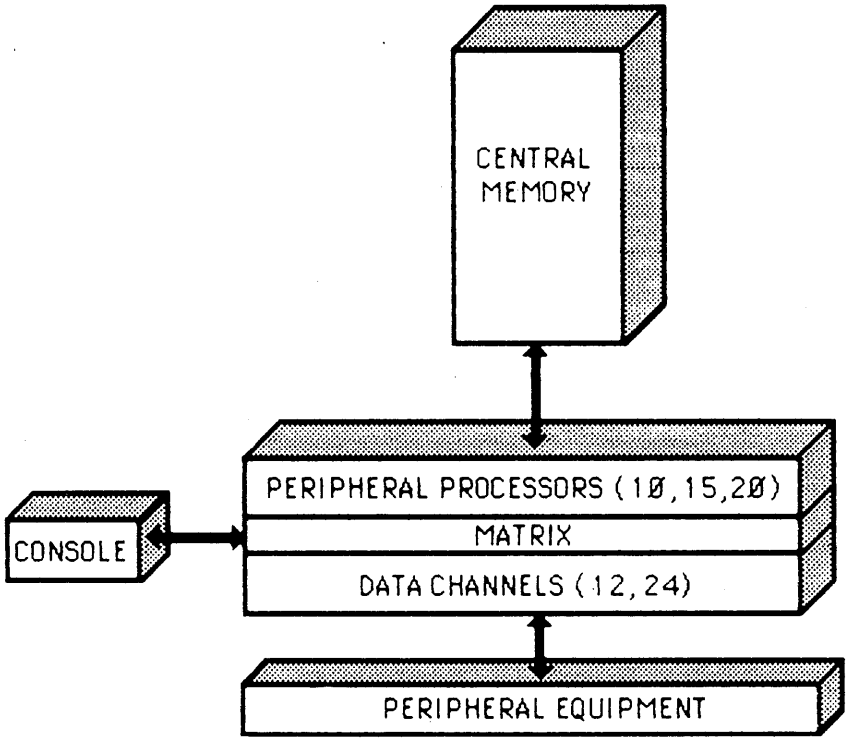
CYBER 170 SERIES 700

825 DIAGRAM





CYBER 170/180 SERIES 800

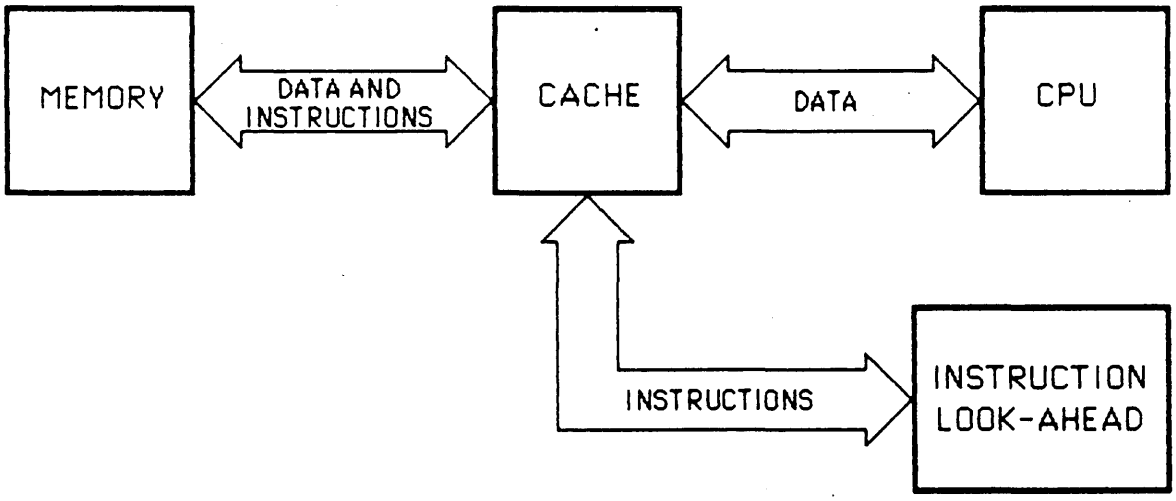


CYBER 170/180

CENTRAL PROCESSOR FEATURES

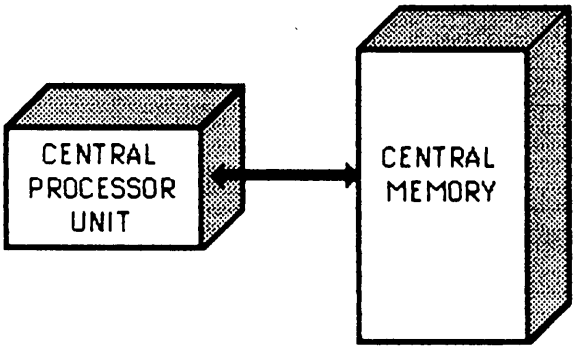
- Register to register operations
- 24 operational registers
- Multiprogramming features
- Instruction look-ahead

CACHE ARCHITECTURE



- Featured on Models 835 through 860 and Model 990
- 2048-word standard on Models 835 through 860, expandable to 4096 60-bit words. 4096 words standard on Model 990.
- Fast (bi-polar) memory used as a high speed buffer
- Transparent to the user and all software
- Reduces effective central memory access time by 75 percent.
- Four words read for instruction and data on Models 835 through 860. Four words read for data on the 990 Model.

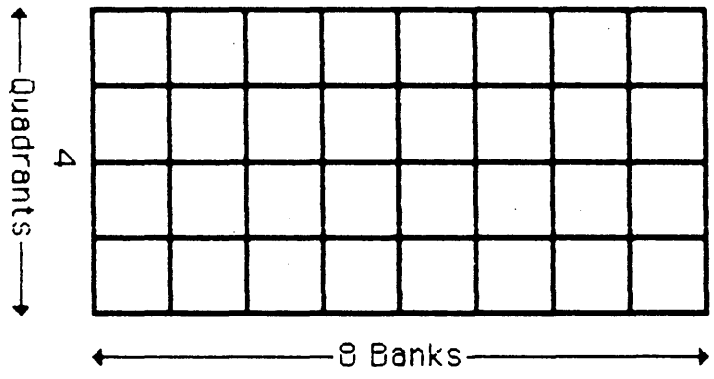
CYBER 170/180 SERIES



CENTRAL MEMORY FEATURES

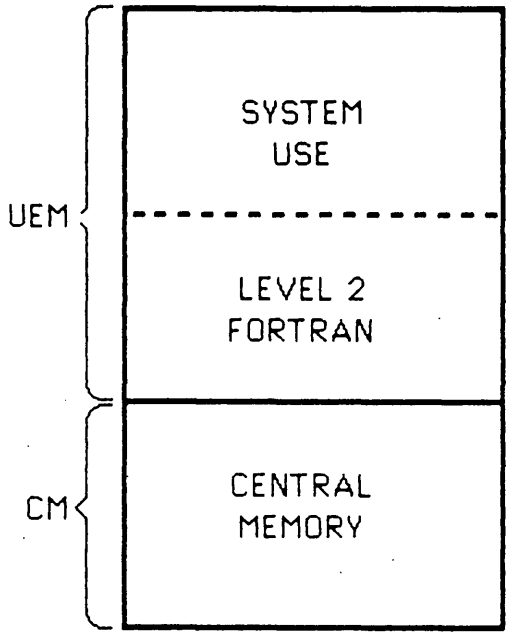
- 60 bit words
- Single error correction, double error detection (SECDED)
- Degradable for reliability
- Phased into 8 banks
- Supports up to 22 processors
- For series 700, option 98K, 131K, 262K words of memory
- For series 800, option 262K, 1M, 2M words of memory
- For CYBER 180, option 262K to 16M words of memory

CYBER 170 SERIES 700 MEMORY

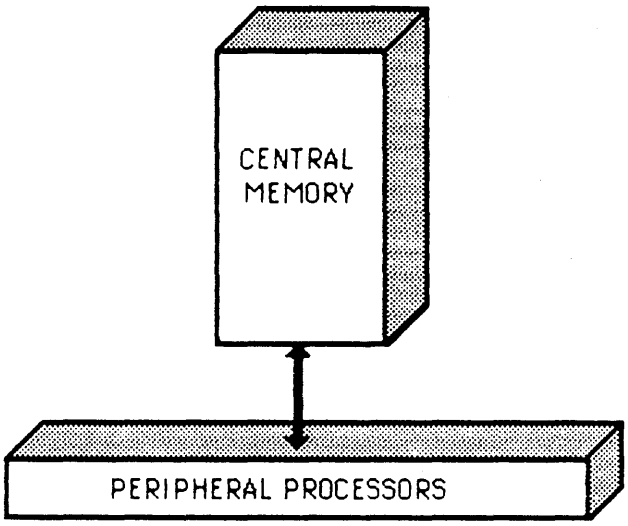


CYBER SERIES 800

TYPICAL MAIN MEMORY ALLOCATION



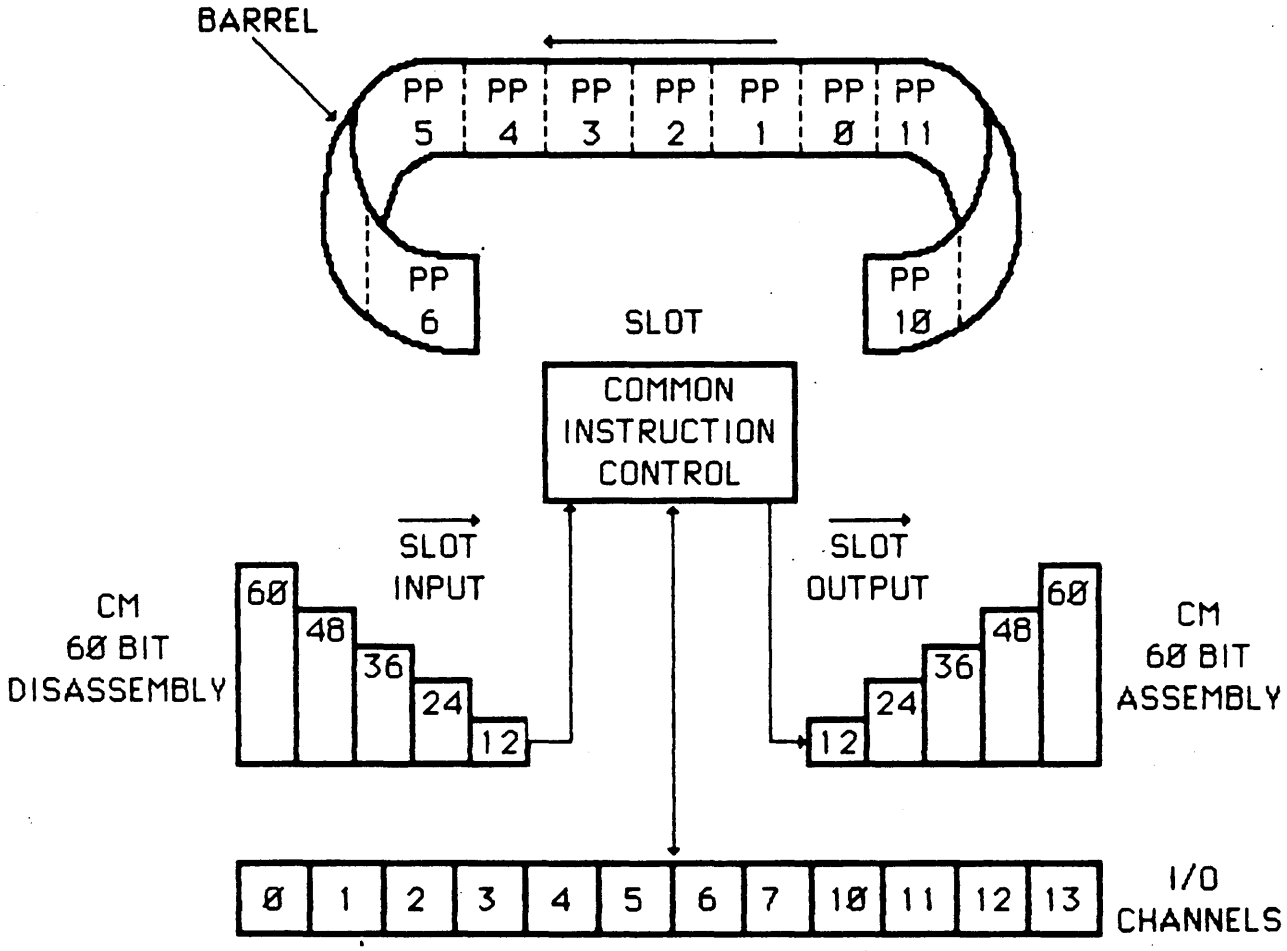
PERIPHERAL PROCESSOR FEATURES



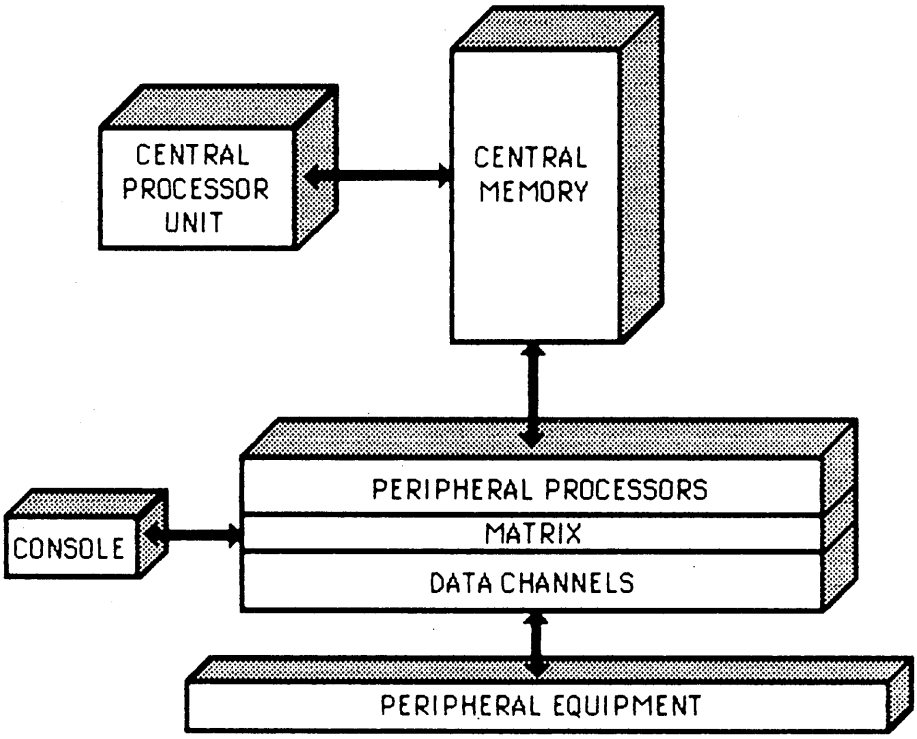
- Options = 10, 14, 17, 20 PP (Series 700)
- Options = 10, 15, 20 PP (Series 800) or 10, 20 PP (Series 800 Models 810, 830)
- Error detection (SECDED)
- Multiple parallel access to central memory
- Access to all input/output channels
- Independent peripheral memories

PERIPHERAL PROCESSOR CONCEPT

- Multiplexing system organization (barrels)
- Time share instruction control hardware (slots)
- Common data paths to and from
  - Central memory
  - I/O channels
  - Extended memory



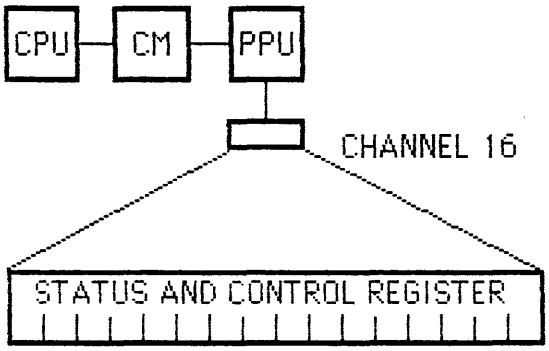
CYBER 170/180 SERIES



INPUT/OUTPUT CHANNEL FEATURES

- Options = 12, 24 channels (except CYBER 180 Models 810-825 which are model dependent)
- Bi-directional, 12 data bits wide (CYBER 170 mode)
- Channel parity
- Up to 8 controllers per channel (controller dependent)
- Maximum 48 million bits per second at 4X speed
- All channels available to all Peripheral Processors
- Activity flag (Active/Inactive)
  (Connect/Disconnect)
- Full/empty flag (Input/Output)

STATUS AND CONTROL REGISTER



- 203 bits
- Hardwired to channel 16

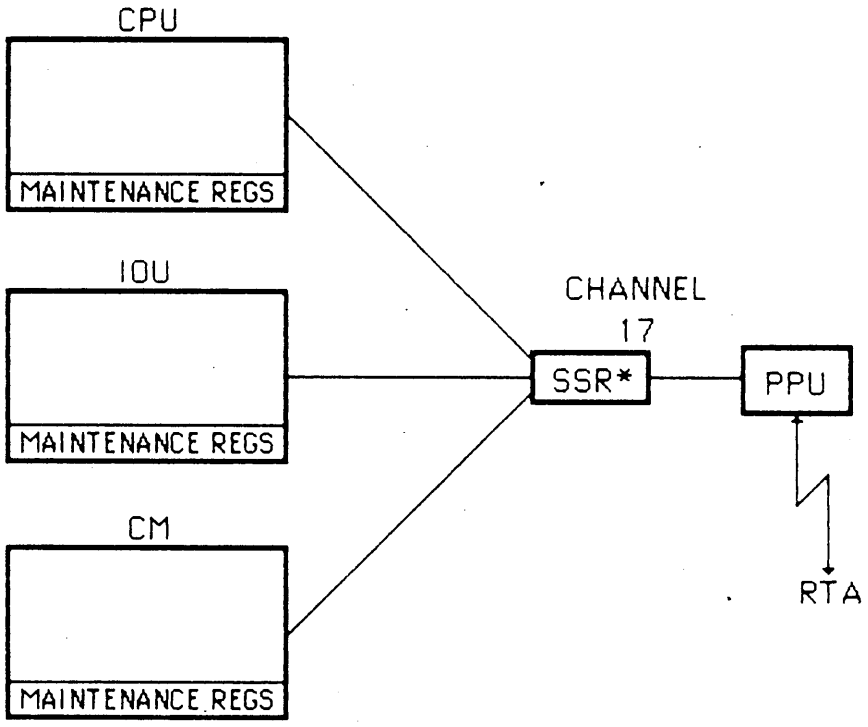
STATUS AND CONTROL REGISTER

- Power detect
- Temperature detect
- Voltage margin variation
- Hardware/software maintenance tool
- On-line fail-soft capability
  - Force PP exit
  - Renumbering of PP's *
  - Down single PP *
  - SECDED control

* At deadstart only

CYBER SERIES 800

MAINTENANCE REGISTERS



* SSR Status Summary Register

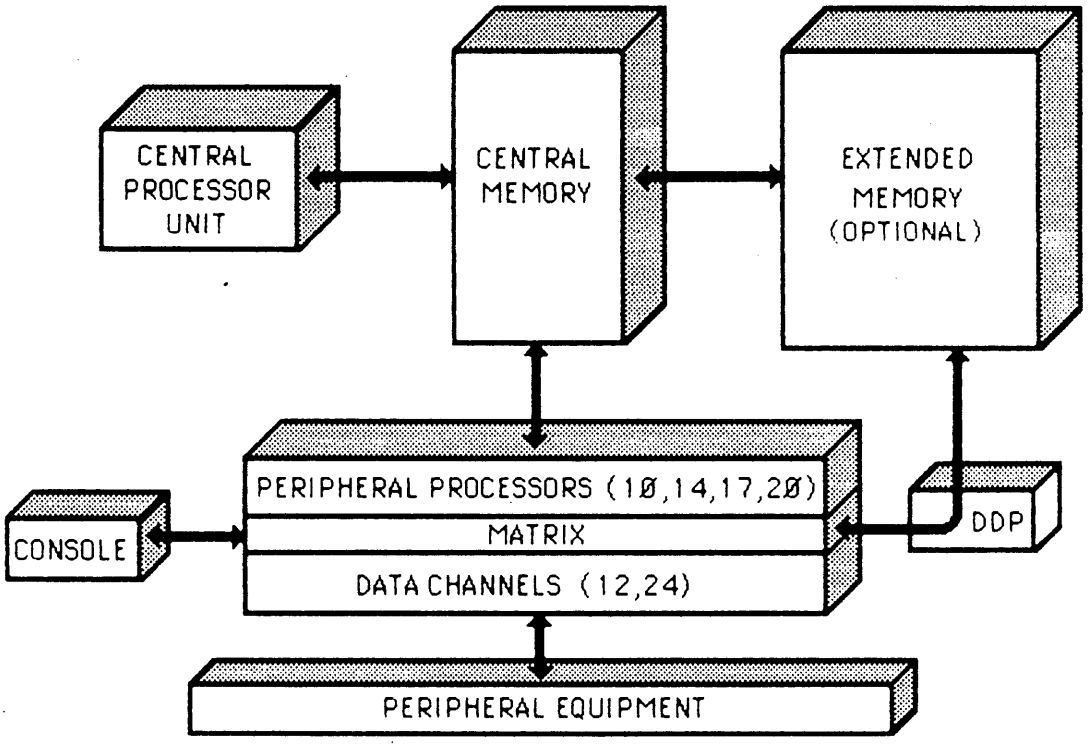
CYBER SERIES 800

MAINTENANCE REGISTERS

- Maintenance channel interface on each of seven system elements (element 0=IOU, rest are machine dependent).
- Provides initialization of registers, controls, and memories
- Monitors and records error information
- Reconfiguration capability
- Verification of error detection and correction hardware

CYBER 170 SERIES

EXTENDED MEMORY



- **Types of Extended Memory**
  - ECS
  - ESM
  - UEM (series 800 only)

CYBER SERIES 800

UNIFIED EXTENDED MEMORY

- Bulk storage within central memory
- Extremely high transfer rates
- Accessible by peripheral processor
- Direct I/O area for high speed mass storage devices

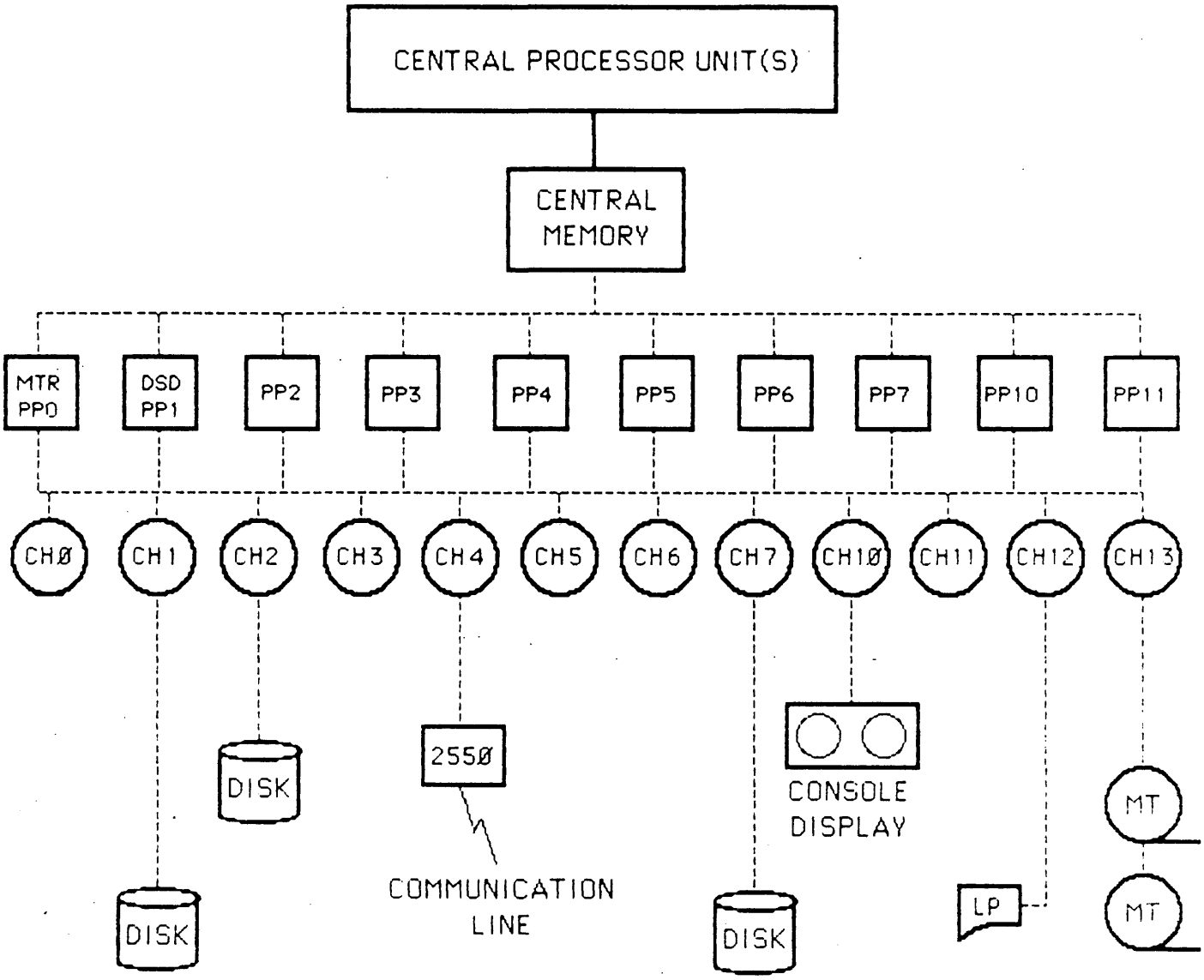
EXTENDED MEMORY HARDWARE FEATURES

- Options = 524K, 1M, 2M words, and above (CYBER 180)
- Used by multiple mainframes (ECS, ESM, but not UEM)
- Phased 131K word banks (ECS, ESM)
- Transfer rate of 10 words per microsecond for ESM
- Error detection

SECDED/PARITY

- Single error correction double error detection
  - Data in central memory
  - Instructions in central memory
- Parity on major lines
  - Peripheral processor memory
  - I/O channels
  - Chassis to chassis
  - Extended memory

TYPICAL NOS CONFIGURATION



QUIZ 1

1. What are the major components of the CYBER 170 computer systems?

2. Describe the function(s) of the following:

   - Central Processor:

   - Central Memory:

   - Channel:

   - Extended Memory:

3. What function does each of the following perform?

   - Disk Subsystem:

   - Magnetic Tape Subsystem:

   - Unit Record Subsystem:

   - Terminal Subsystem:

LESSON 2

SYSTEM FLOW

LESSON 2

SYSTEM FLOW

Lesson Preface:

This lesson describes the path a job takes while processing through the system. Topics discussed include batch jobs, execution of a job, system and operator message, and interactive jobs.

Objectives:

Upon completion of this lesson, the student will have a basic understanding of the following:

- Job
- Job Step
- Central Memory Layout
- Exchange Packages

References:

None

JOB vs. JOB STEP

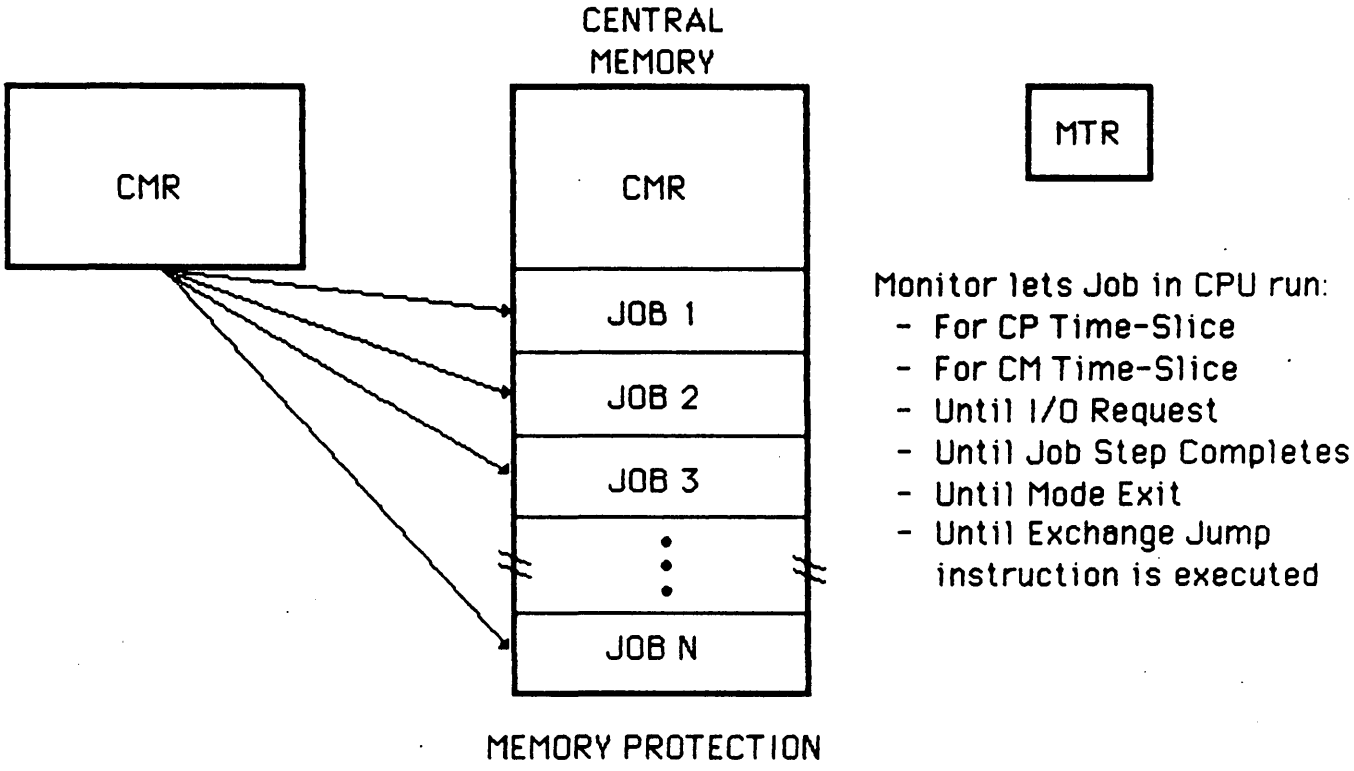
JOB is a set of commands and the data and directives used by those commands. A batch job must begin with a JOB and USER commands. An interactive JOB is all activity associated with a terminal session from login to logout.

JOB STEP is an individual command or load sequence. A group of JOB STEPS create a JOB stream or JOB.

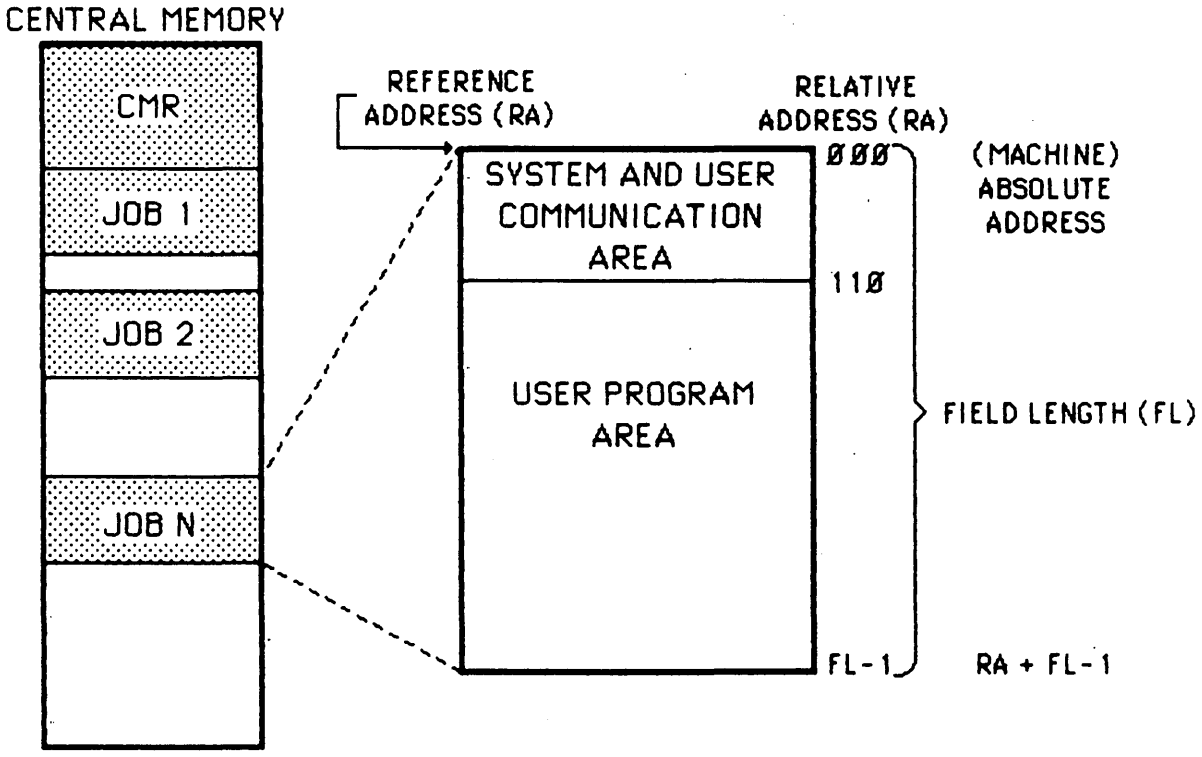
A unique JSN (job sequence number) is associated with every job and every output routed by the job.

A user definable UJN (user job name) can be associated with every job and every output routed by the job.

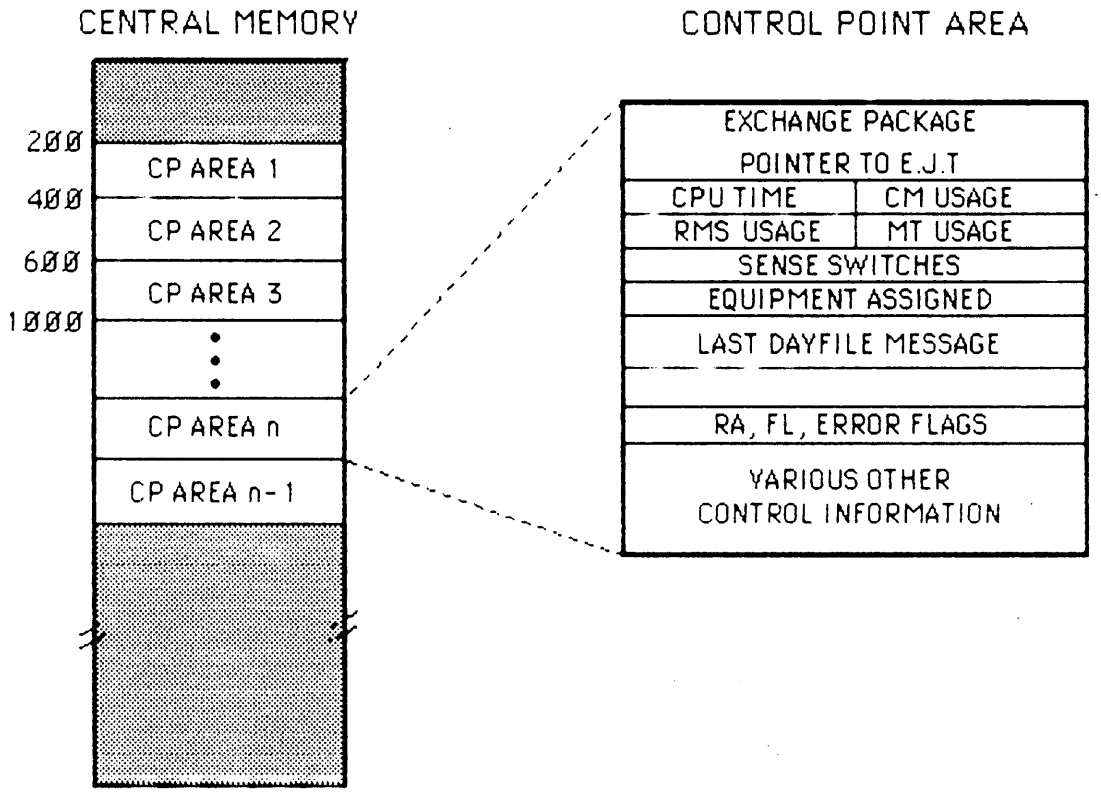
MULTI-PROGRAMMING



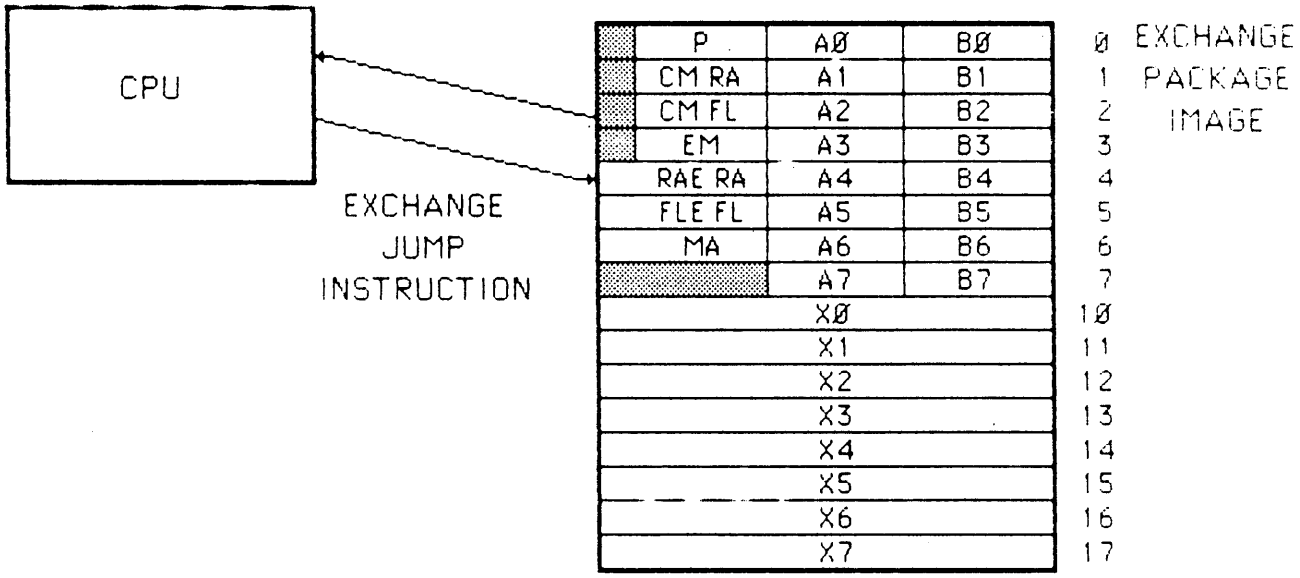
MEMORY PROTECTION



CONTROL POINT CONCEPT



EXCHANGE PACKAGE



USER VALIDATION

- Equipment usage
- File usage
- Machine usage
- System usage
- Terminal usage
- Application usage

USER LIMITS

- Local file size
- Direct file size
- Number of dayfile messages
- Number of cards punched
- Number of lines printed
- Number of tapes used

ACCOUNTING DATA

- Log on/log off time
- CPU time
- System seconds
- Mass storage transfers
- Magnetic tape transfers
- Cards read/punched, lines printed
- Core memory used (words per second)
- Project number
- Permanent file usage

SYSTEM RESOURCE UNIT (SRU)

- Central memory field length
- EM field length
- CPU time
- Mass storage usage
- Magnetic tape usage
- Permanent file usage

LESSON 3

SYSTEM DESCRIPTION

LESSON 3

SYSTEM DESCRIPTION

Lesson Preface:

This lesson introduces the student to the basic components that make up the software system. Items covered are the following: operating system, memory management, and subsystems.

Objectives:

After completing this lesson, the student will have a basic understanding of the following:

- Central memory layout
- Operating system subsystems
- Various software packages available
- Controlling of subsystem execution

References:

- NOS 2 Operations Handbook - Pub. No. 60450310

NETWORK OPERATING SYSTEM (NOS)

MULTI-MODE SYSTEM

- Local batch
- Remote batch
- Deferred batch
- Time-sharing
- Transaction processing
- Network capabilities

CDC CYBER 170/180 SERIES

OPERATING SYSTEM GOALS

- Provide maximum job throughput
- Provide maximum system resources to user
- Provide system reliability
- Provide for system maintainability
- Provide system flexibility

PRIMARY SYSTEMS RESOURCES

- CPU
- Central memory and extended memory
- Mass storage
- Magnetic tape

OPERATOR'S CONSOLE

- Monitor jobs in system
- Change scheduling parameters
- See tape/private pack staging queues
- Check/set equipment status
- Communicate with remote and local users
- Monitor all system queues
- Monitor permanent file activity/status
- Monitor Error Log
- Monitor Operator Action Display
- LOG reason for system interrupts

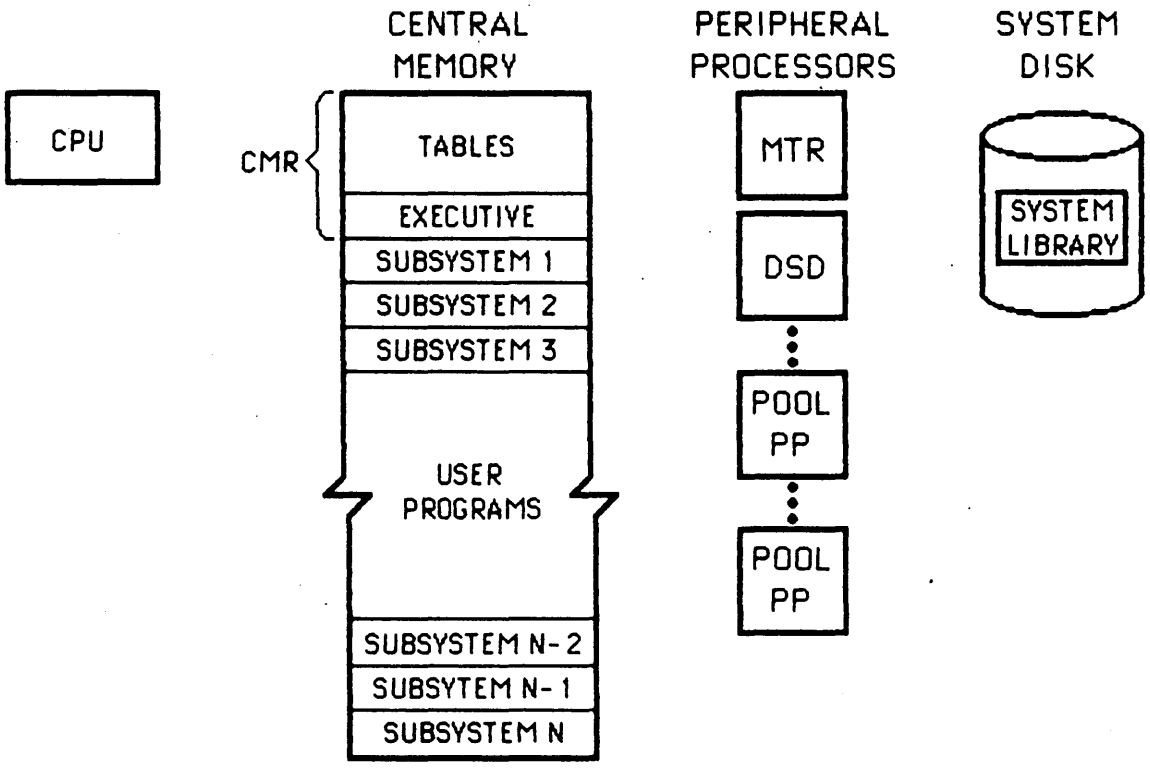
BASIC SYSTEM IMPLEMENTATION

- Separation of system functions
  - CPU
  - PP
- Central Processor functions
  - System executive
  - Realtime monitor
  - Memory used as buffers for PP functions
- Peripheral Processor functions
  - System monitor (PP0)
  - Scheduler (1SJ)
  - Input and output functions (QAC, etc.)
  - Drive console display (DSD)
  - Front-end system to communication network (PIP)
  - Analyze terminal status
  - Drive all peripheral equipment (1MS, 1MT, etc.)
  - Drive link to other mainframe (RHF)

OPERATING SYSTEM COMPONENTS

- Executive
- Subsytem
- Loader
- Products (compilers, assemblers, etc.)

SYSTEM LAYOUT



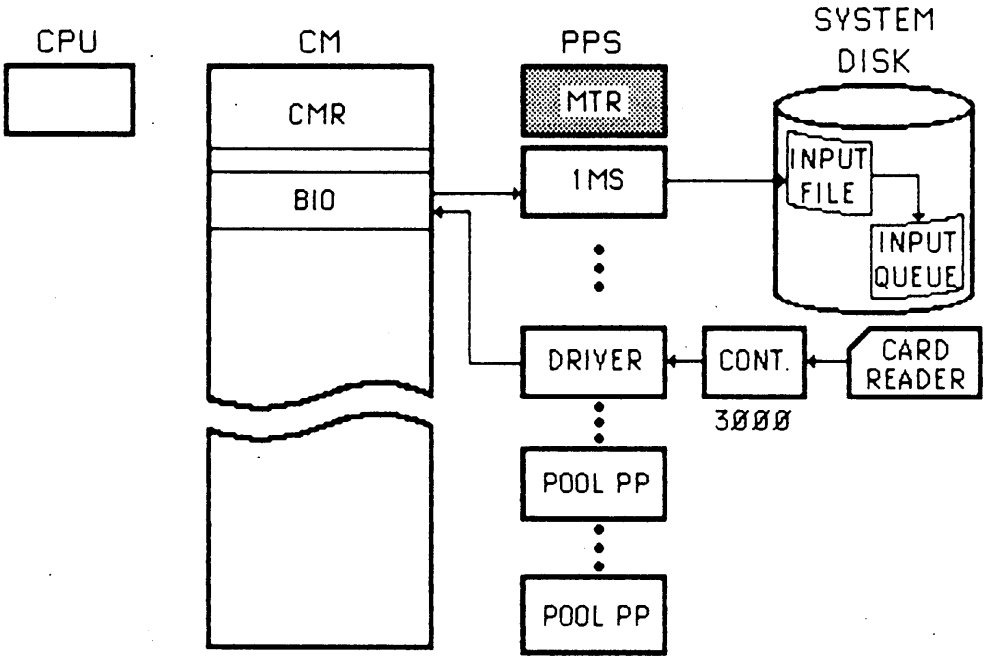
SUBSYSTEMS

- MAG
- BIO
- NAM
- RBF
- IAF
- TAF
- CDC
- MCS
- MSS
- MAP
- PNI
- RDF (IAF)
- PSU
- TLF
- TCF
- NJF
- NVE

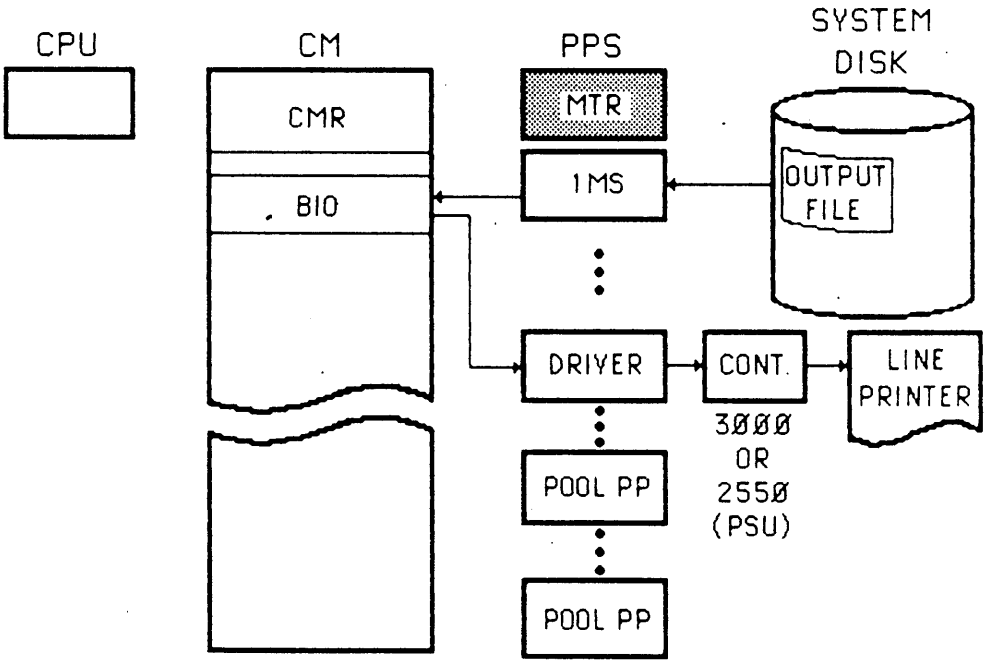
BATCHIO SUBSYSTEM (BIO)

- Drive local unit-record equipment
  - Card reader (1200 CPM)
  - Line printer (2000 LPM); non-impact (5X70)
  - Card punch (250 CPM)
- Can drive simultaneously 8 pieces of equipment (any combination of CR, LP, CP)
- Reads card reader and creates new job in input queue
- Scans output queue and sends output to appropriate line printer
  - Print Support Utility (PSU) drive (53X printers)

BATCH INPUT FLOW



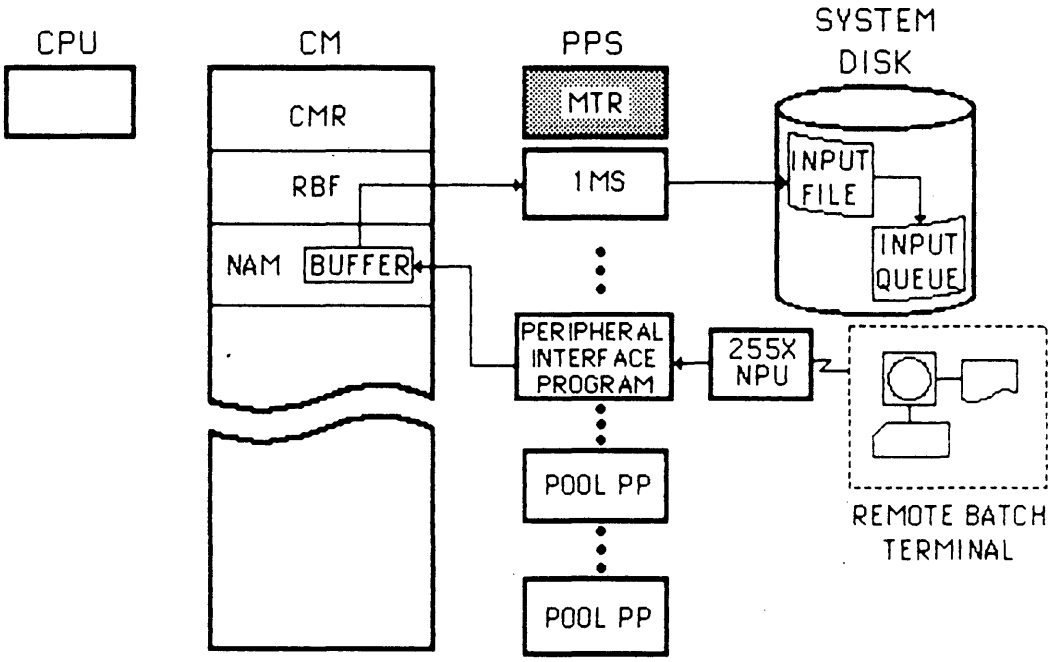
BATCH OUTPUT FLOW



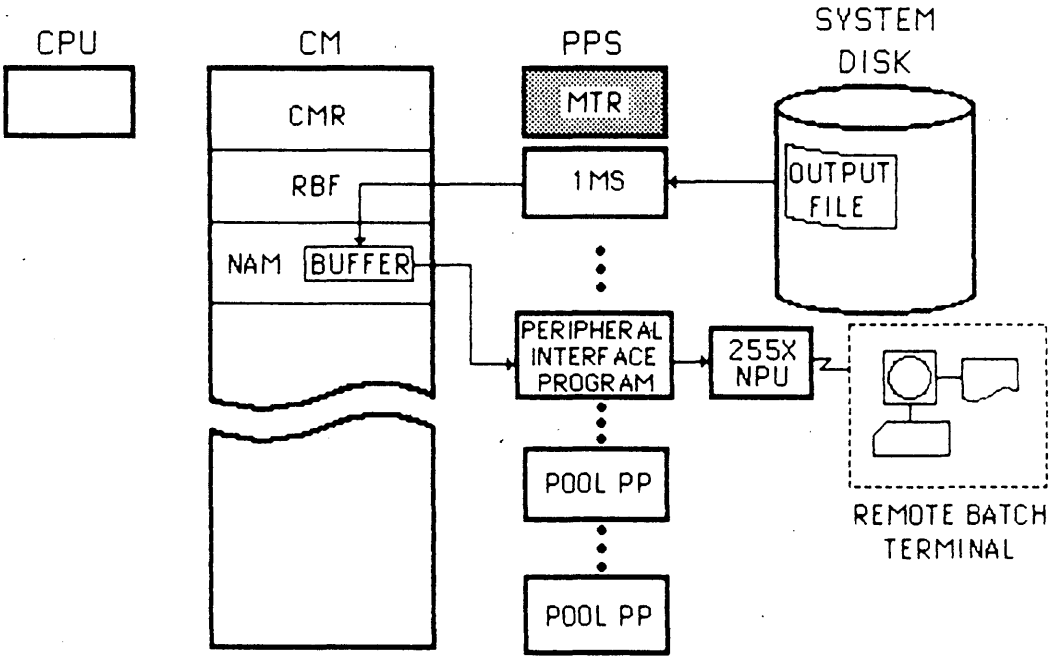
REMOTE BATCH FACILITY (RBF)

- Provides batch file transmission between remote terminals and host computer system mass storage.
  - Batch terminal user interface to system queues
  - User control of files via command language
  - Status of files and devices
  - Terminal independence

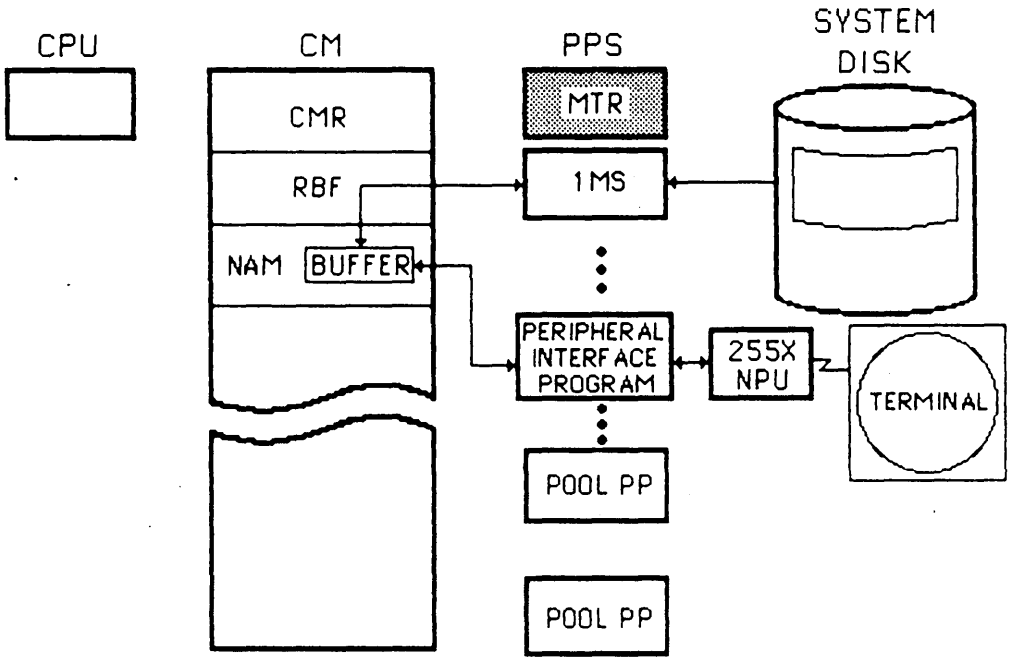
REMOTE BATCH INPUT FLOW



REMOTE BATCH OUTPUT FLOW



INTERACTIVE FACILITY (IAF)



- Factors affecting response time:
  - Number of users on-line
  - Size of user program
  - Speed of mass storage (swapping)
  - Type of activity (editing, etc.)
  - Size of time-slice
  - Use of extended memory

- IAF functions
  - Create an input queue entry for a terminal login
  - Handles all I/O to/from a job to a terminal

SUBSYSTEM CONTROL COMMANDS

CDCffff.	CYBER Database Control System (CDCS)
BIO.	Central Site Batch Input/Output
MAGffff.	Magnetic Tape Subsystem
MCSffff.	Message Control System
MSSffff.	Mass Storage Subsystem
NAMffff.	Network Access Method
RBFffff.	Remote Batch Facility
TAFffff.	Transaction Facility
MAPffff.	Mathematical Algorithm Processor
STMffff.	Interactive Stimulator
RDFffff.	Remote Diagnostic Facility
RHFffff.	Remote Host Facility
SMFffff.	Screen Management Facility
SSFffff.	SCOPE 2 Station Facility

Where:

ffff	Version of subsystem

SUBSYSTEM CONTROL COMMANDS (cont.)

IAFffff.	Call the Interactive Facility Subsystem (must be at control point 1)
ONSW,IAF,1.	Detach sessions at IAF termination for later recovery by user and inhibit session restart operation
ONSW,IAF,2.	Allows use of delay queue option (response time appears consistent)
ONSW,IAF,3.	Aborts subsystem on all abnormal conditions
ONSW,IAF,4.	Enables dump on normal termination (used after a STOP,IAF. entry)
ONSW,IAF,5.	Dump to OUTPUT file after subsystem is dropped or aborted (default)
ONSW,IAF,6.	Release output file for printing (from ONSW, IAF, 5)
IDLE,sub.	Set idledown status for subsystem (graceful drop)
STOP,sub.	Drop subsystem (console must be unlocked - use only under analyst supervision)

Where:

ffff Version of subsystem desired

sub Subsystem name

SYSTEM CONTROL COMMANDS

AUTO. Calls specific subsystems to control points and initiates automatic job processing.

MAINTENANCE. Same functions as AUTO and initiate maintenance class jobs.

ENABLE,op,cp. Enables operation at specified control point (optional) for subsystem or system options.

or

DISABLE,op,cp. Disable operation.

Where op may be:

BIO	Batch input/output subsystem
CDC	CYBER Database Control System
ENGR	Engineering Mode for on-line diagnostics
IAF	Interactive Facility (cannot enter control point)
MAG	Magnetic Tape Subsystem
MAP	Mathematical Algorithm Processor
MCS	Message Control Subsystem
MSS	Mass Storage Subsystem
NAM	Network Access Methods
RBF	Remote Batch Facility
RHF	Remote Host Facility Subsystem
SMF	Screen Management Facility
STM	Stimulator for IAF (cannot enter control point)
TAF	Transaction Facility
FILE STAGING	Staging of MSF resident permanent files to disk
LOGGING	Logging of performance statistics
MASTER MAS	Master Mainframe mode for 7990 MSS
MASTER MSS	Master Mainframe Mode (MSS)
MS VALIDATION	Automatic verification of mass storage table
PF VALIDATION	Verification of BOI/EOI on preserved fiels

PRIVILEGED RDF	Privileged mode of the Remote Diagnostic Facility
RDF	Remote Diagnostic Facility (always runs at Control Point 1)
REMOVABLE PACKS	Automatic label checking for mass storage devices
RESIDENT RDF	Resident mode of the Remote Diagnostic Facility
SECONDARY USER CARDS	More than one USER statement per job
SPINDOWN	Automatic 83X Spindown after checkpoint
SYSTEM DEBUG	System error tolerance mode
USER EXTENDED MEMORY	User access to extended memory

SUBSYST. Subsystem Status/Control Utility.

LESSON 4

DYNAMIC SYSTEM DISPLAYS (DSD)

LESSON 4

DYNAMIC SYSTEM DISPLAYS (DSD)

Lesson Preface:

This lesson introduces the student to the displays that are available under DSD. Topics covered are the commands to call the various displays, the format of the display, and the sub-displays that are available.

Objectives:

After completing this lesson, the student should have a basic understanding of the displays that are available, how to access them, what information is available, and be able to explain the right and left screen header.

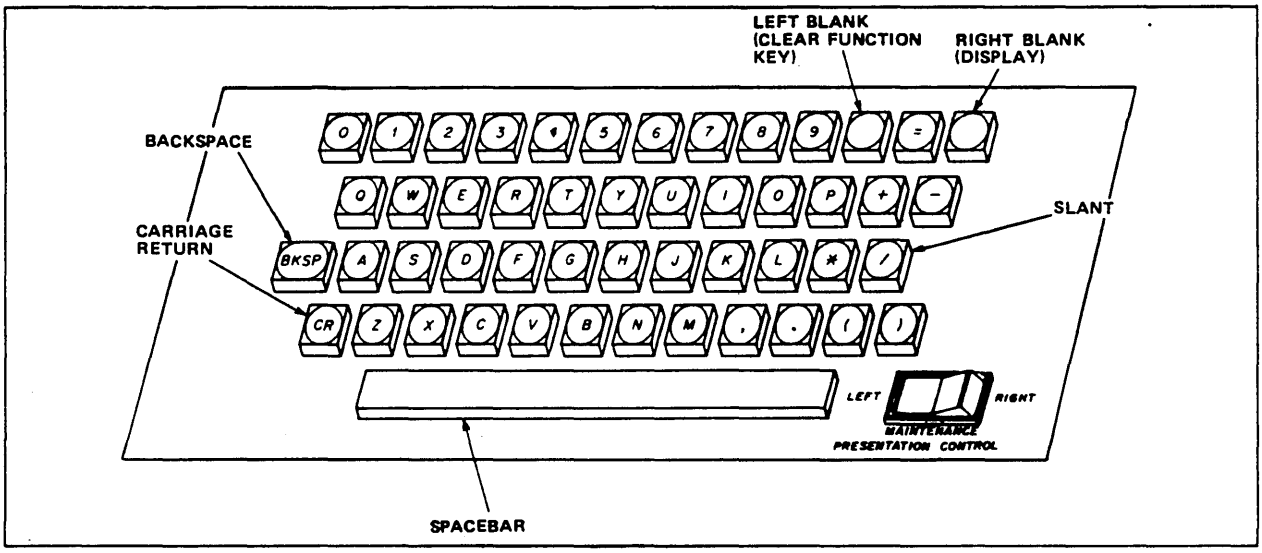
References:

NOS 2 Operations Handbook - Pub. No. 60459310

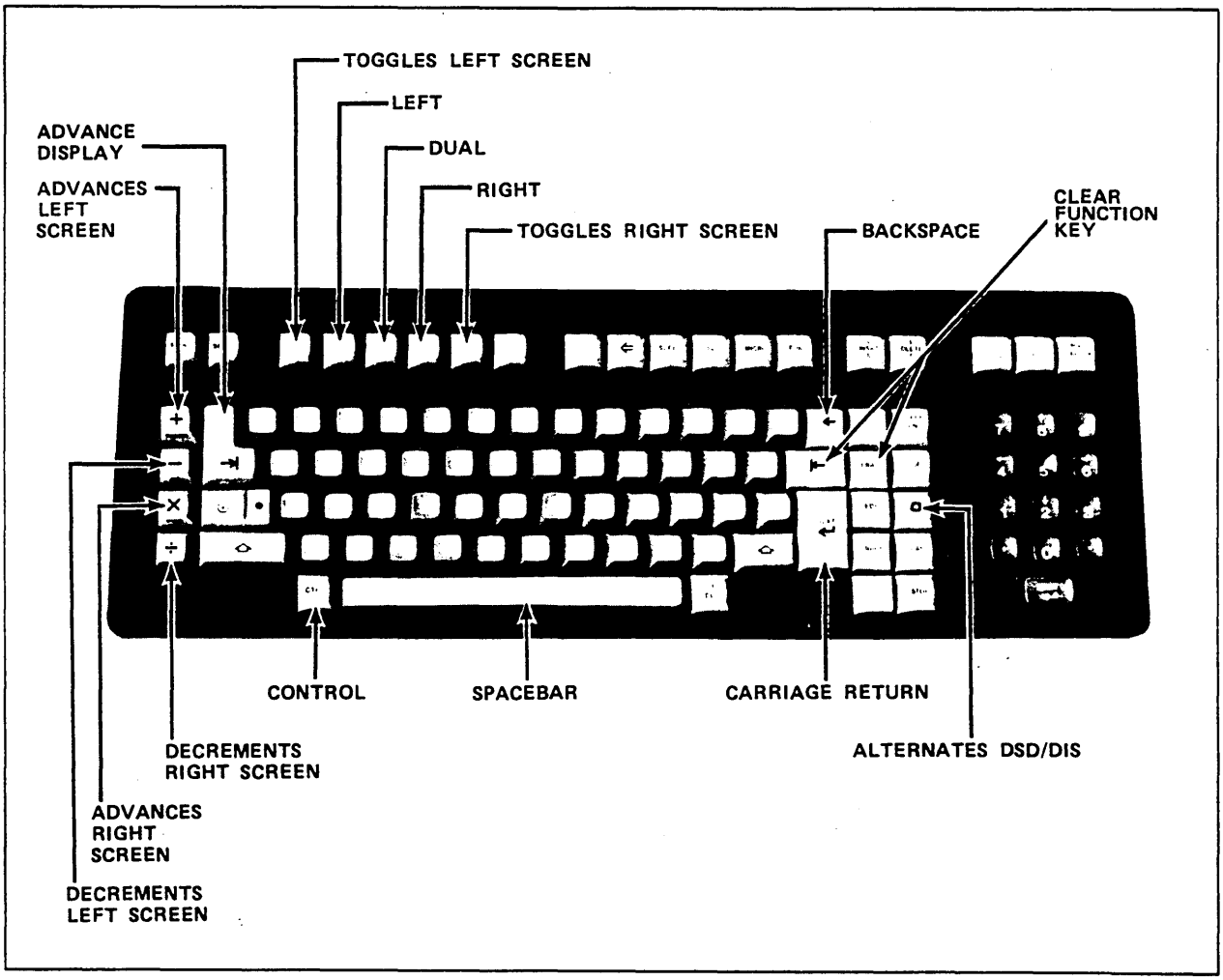
Projects:

Quiz 4
Laboratory 1

CONSOLE KEYBOARD



CC545 CONSOLE KEYBOARD



CC634B CONSOLE KEYBOARD

DISPLAY SELECTION

Select any of the DSD displays with the console command:

xy.

where x and y represent the letter designation of the displays.

x appears on the left screen and y appears on the right. If x and y are identical, usually both screens display the same information. A subdisplay may be chosen by entering x, z. Where x is the main display, a comma denotes a subdisplay, and z denotes which subdisplay. The displays available under DSD are as follows:

Letter Designation	Display	Description
A	Dayfile	Chronological history of system operations. There are five subdisplays. (A,. or A.; A,Account file; A, Error log; A, Operator; and DAYFILE,jsn.) A. causes a display to "bounce" back to top line.
B	Job Status	Current status of all jobs assigned to control points. There are two subdisplays (B,A and B,O)
C, D, F, G	Central Memory	Display Central Memory.
E	Equipment Status	Status of peripheral devices. There are several subdisplays. (E,A; E,C; E,E; E,F; E,M; E,P; and E,T)
H	System Files	List of fast attach and system files.
I	BIO Status	Status of central site unit record devices.
J	Executing Job Status	Status of specified job sequence name

Letter Designation	Display	Description
K	CPU programmable	Direct operator/CPU program communication
L	CMR buffer interface program	System utility left screen communication
M	Extended Memory	Displays Extended Memory contents
O	Transaction Status	TAF transaction displays
P	PP communications area	Current contents of PP registers
Q	Queue status	Status of active input/output queues. There are several subdisplays i.e., Q,IN Q,PR
R	Rolled out file status	All executing jobs, including rolled out jobs and jobs at control points
S	System control information	Parameters used to control job flow
T	Interactive terminal status	Status of interactive (IAF) users
Y	Monitor functions	List of all monitor (PP function) mnemonics and codes
W	System Information	List of system queue FWA's channels, etc.
Z	Directory	List of the letter designators and descriptions of all DSD displays.

SYSTEM CONTROL COMMANDS (cont.)

DISPLAY SET COMMAND SET,SCREENS.	Sets up four displays for rotation of the left screen.
UNLOCK.	Allows entry of the following restricted commands DATE.yy/mm/dd. SPINDOWN,est. SPINUP,est. STOP, subsystem name. TIME.hh.mm.ss. UNLOAD,est. (nonremovable shared mass storage device) MEMORY CHANGES OVERRIDE
LOCK.	Locks the console keyboard.

QUIZ 4

1. Where is UNLOCK displayed when the system is unlocked?

2. Name four additional commands available when system is in unlock mode.

3. What is the difference between entering EA. and E,A.?

4. What is the difference between + and - in relation to displays?

5. What is the difference between + and (in relation to displays?

6. What sequence of commands will bring up both the description of mounted tapes and the VSN's of requested tapes on the left and right screen concurrently?

7. What key on the CC634B console presents a menu of that console's special keys?

LABORATORY 1

1. Bring up the A display on the right screen and B display on the left screen.

2. Put the console in repeat mode and display system dayfiles.

3. Get out of repeat mode. Which key did you use? _____

4. Bring up the display which illustrates the following:

    a. The system dayfile
    b. An individual user dayfile
    c. The error log
    d. Subsystem status
    e. Channel activity
    f. Job using the central processor

5. Set up four displays to be used with the toggle display key.

6. Sequence throught the default displays.

    a. Which screen changed?
    b. Where is the toggle display key located?

LESSON 5

EQUIPMENT CONFIGURATION

LESSON 5

EQUIPMENT CONFIGURATION

Lesson Preface:

This lesson introduces the student to the concepts of logical devices, controllers, channels, and equipment configuration.

Objectives:

After completing this lesson, the student should have an understanding of the system configuration and be able to bring equipment up and down.

References:

NOS 2 Analysis Handbook - Pub. No. 60459300

EQUIPMENT STATUS TABLE

(E,. or E,A.)

- List the status of all peripheral equipment
- One entry per each logical device
- Map of 1000B (512) logical devices
- First EST entries are special cases

Entry 0 :	RD	Used for on-line reconfiguration
1 :	DS	Console
2 :	NE	Null device
3 :	TE	Tape Equipment
4 :	TT	Used for assignment of terminal files
5 :	DE/DP	Extended Memory device (or empty)

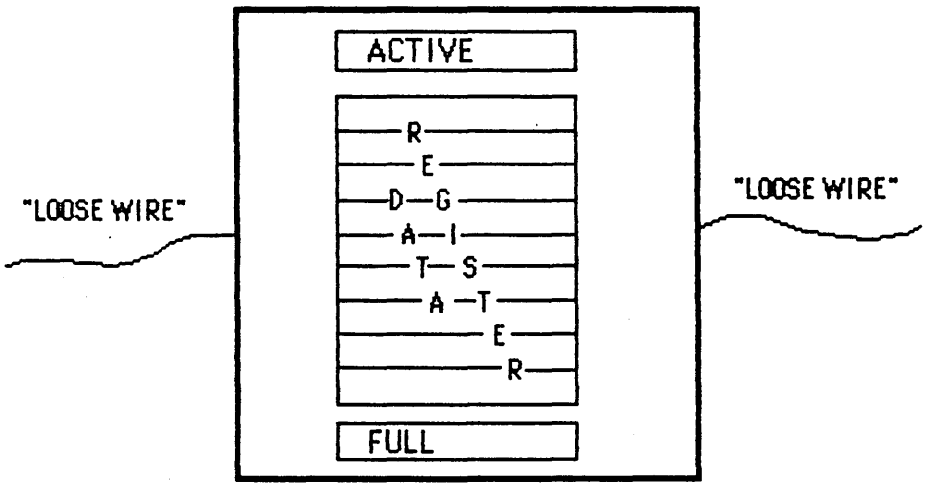
- Mass storage devices must be below EST ordinal 310B.
- The MSAL commands are restricted to mass storage devices below EST ordinal 60B.

DATA CHANNEL INPUT/OUTPUT

Peripheral processors and external equipment are connected through data channels. The PPs use them to control and perform input/output tasks. CYBER systems have 12 to 24 data channels, depending on the number of PPs in the system. Physically, each data channel is connected to all the PPs so that any PP can access any data channel. But, external devices are wired to specific data channels so they can only be accessed on that channel(s). Up to sixty four devices can be accessed on a single data channel.

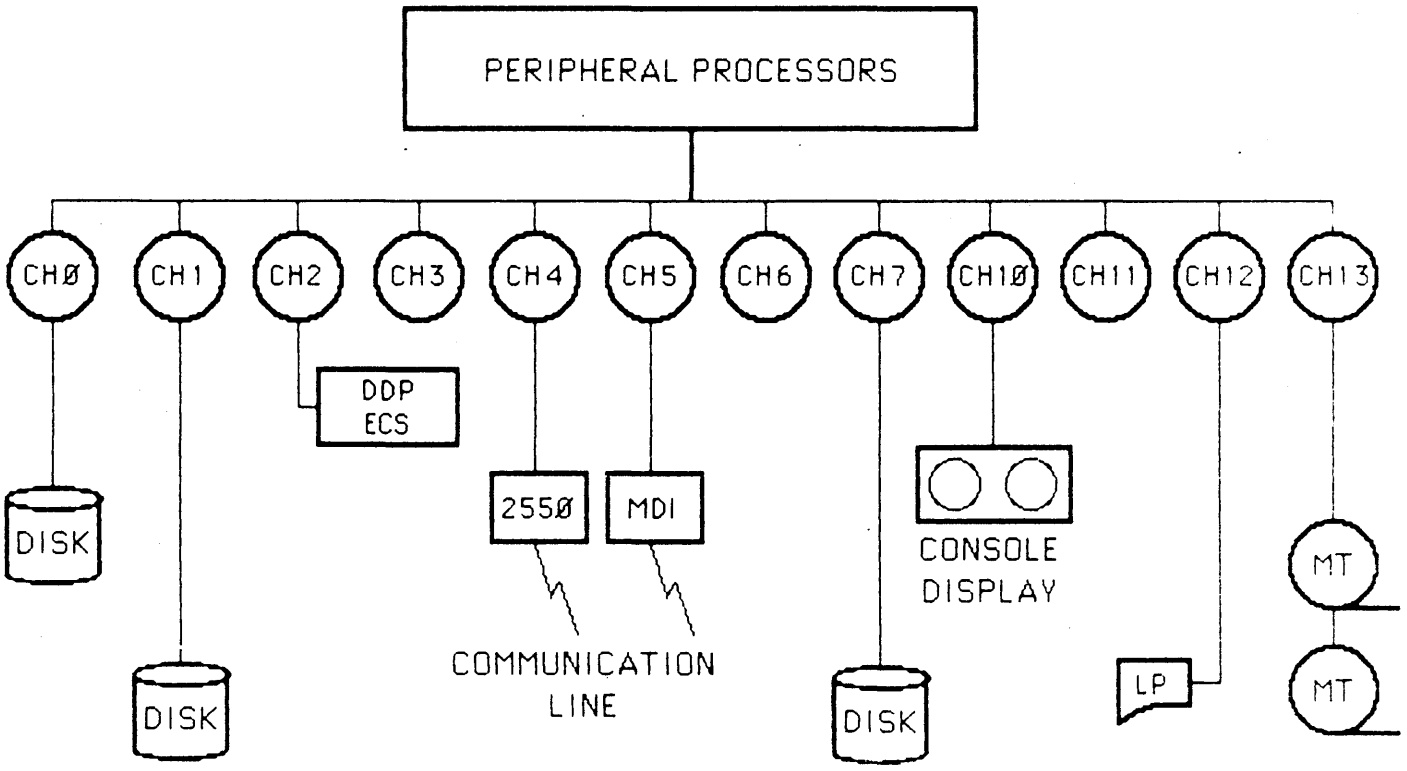
Logically, a data channel can be viewed as a "black box" with a loose wire at each end. When the data channel is in use, one wire is connected to a PP. The other wire may also be connected to a PP, but it is usually connected to a peripheral controller. The protocol for using a data channel transforms the physical possibilities into logical actualities, and the "loose wires" are logically connected.

Inside the "black box" is a 12 or 16 bit data register and two flags (see figure below). One of the flags, the active flag, must be turned on to perform I/O. The other flag, the full flag, is turned on by putting data into the channel's data register and turned off by taking the data out of the channel's data register. During a "write" operation, a PP outputs to the channel, filling the register and turning on the full flag. Sensing the full condition, the controller inputs the data from the channel, turning off the full flag. While the controller is recording or displaying the data it inputted, the PP senses the empty condition on the channel and outputs the next word of data to the channel.



DATA CHANNEL

TYPICAL NOS CONFIGURATION



PERIPHERAL CONTROL COMMANDS

- Discontinue use of channel, max channel, or equipment

  - DOWN,CHcc.
  - DOWN,CHcc,EQest.
  - DOWN, MCHcc.
  - DOWN, MCHcc,EQest.
  - DOWN,EQest.
  - OFF,est. — Logical turns off a device. Device can still be dumped and loaded.
  - UNLOAD,est. — Logically remove a mass storage device from the NOS environment.
  - IDLE,EQ=est. — Disallow new file assignment unless no other device is suitable. Existing files continue to be accessed.

- Resumes normal use of channel, mux channel, or equipment.

  - UP,CHcc.
  - UP,MCHcc.
  - UP,MCHcc,EQest.
  - ON,est. — Logical turns on a device.
  - REDEFINE — Utility used to reconfigure mass storage devices.

QUIZ 5

1. PP5 can talk to which devices?

2. Is each tape controller in one logical device?

3. How many devices can be put on a channel?

4. How are PP numbered?

5. How are the physical data channels numbered?

LESSON 6

MASS STORAGE

LESSON 6

MASS STORAGE

Lesson Preface:

The lesson covers Mass Storage as related to family, system devices and temporary and permanent files.

Objectives:

Upon completion of this lesson, the student should have an understanding of the following:

- Family concepts
- How to bring a family up and a family down
- Permanent vs. temporary files
- Reconfigure disk allocation
- E,M. and E,C. display

References:

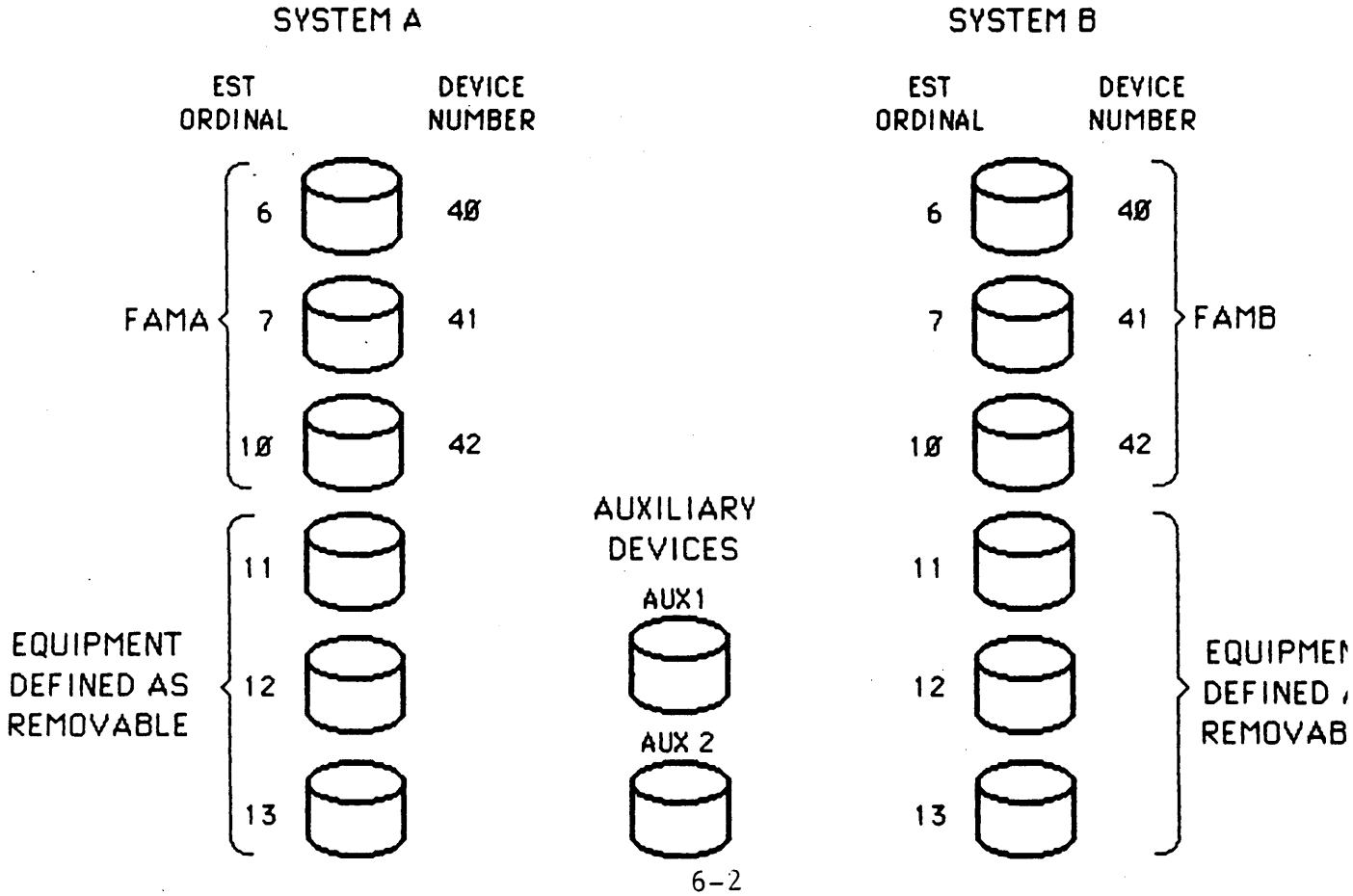
- NOS 2 Analysis Handbook - Pub. No. 6045900
- NOS 2 Operations Handbook - Pub. No. 60459310

FAMILY

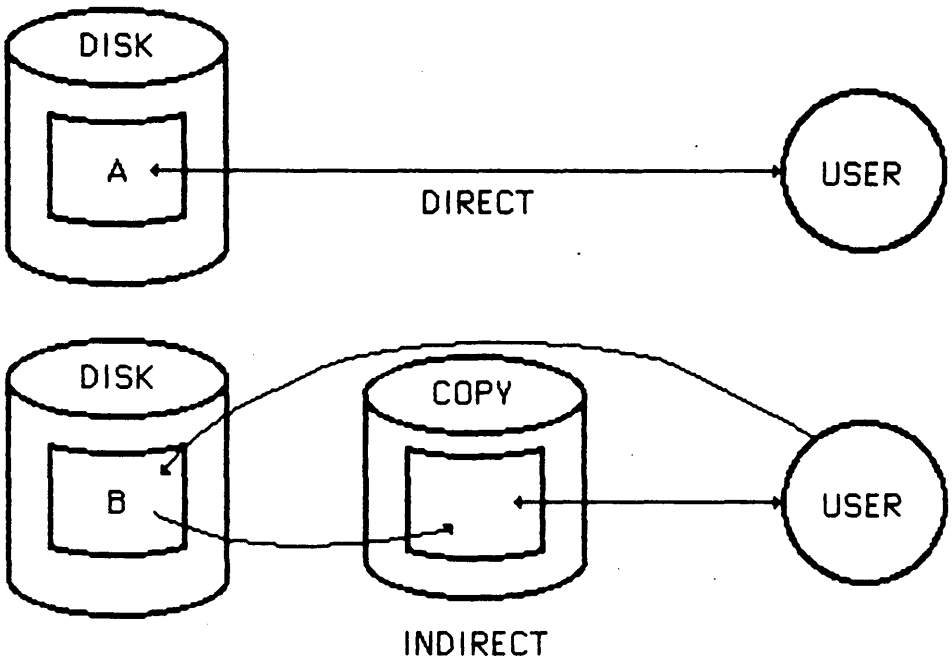
A family is a collection of 1 to 63 logical devices identified by a one- to seven-character family name. Users and their files are grouped together according to the family available to them. Usually, the grouping is within the configuration on which these users normally run jobs. However, a family can be connected to any configuration and still relate to the same users and files.

An auxiliary device, identified by a one- to seven-character pack name, is a single device that is not included in any family and can be accessed by validated users from any family. An auxiliary device provides users with an alternative to the master devices for storing and accessing permanent files. Use of auxiliary devices enables an analyst to provide special sets of permanent files for selected users or for designated periods. For example, an auxiliary device could be made available from 1200 to 1700 every day for any properly validated user.

A permanent file device is either a member of a family or an auxiliary device. Permanent files on family device are accessed through user catalogs contained on a master device within the family. The user catalogs that reference permanent files on an auxiliary device are contained on that device; that is, an auxiliary device is a self-contained entity.



PERMANENT FILE TYPES



PERMANENT VS TEMPORARY FILES

PERMANENT	TEMPORARY
Space is deallocated when user explicitly purges file	Space is deallocated at job termination
File exists across deadstart	File and space is returned after a level zero deadstart
File space is allocated relative to family and user index mask (E,F display)	File space is allocated relative to mass storage table (E,M display)

MOUNT,est. or MOUNT,est,P.	Clears local and global unload status for a mass storage device and reactivates it. Use P parameter to preset multi-mainframe information on first mainframe.
IDLEFAMILY,est.	Activates or deactivates a family. No direct or fast attach files can be active.
INITIALIZE, op,est,...,est.	Reverses current setting of initialize option for one or more mass storage devices. Example options are PF, DF, AL for permanent files, Dayfile, and all files, resp.
MSAL,t=est,...est.	Assigns job files of type t to one or more mass storage devices. Example types are T for temporary files and R r=for rollout files.
SRST,S.	Change secondary rollout section threshold size in sectors.
SPINUP,est. SPINDOWN,est.	Request spinup or spindown of a 834 and 836 disk storage device.
UNLOAD,est.	Logically removes a mass storage device from the NOS environment.

QUIZ 6

1. Name two types of permanent files?

2. What is the difference between temporary and permanent files?

3. Which display shows how many tracks are available on a disk?

4. Which display shows the current count of direct access permanent file users?

5. Which display shows the system's fast attach files?

6. Which display shows the system's family names?

7. Which display shows permanent file device numbers?

LESSON 7

UNIT RECORD DEVICES

LESSON 7

UNIT RECORD DEVICES

Lesson Preface:

This lesson introduces commands having to do with Local Batch I/O devices.

Objectives:

Upon completion of this lesson, the student should have an understanding of unit record device commands and displays.

Reference:

NOS 2 Operations Handbook - Pub. No. 60459310

LOCAL BATCH INPUT/OUTPUT (BIO)

UNIT RECORD EQUIPMENT COMMANDS

lx.	Display unit record equipment status.
ON,est.	Logically turns on device.
OFF,est.	Logically turns off device.
STOP,est.	Suppress printing (equivalent to pressing stop button)
END,est.	End operation.
CONTINUE,est.	Continue printing.
SUPPRESS,est.	Suppress page eject on print file.
BKSP,est,rr.	Backspace "RR" records on print file.
BKSP,est,ff.	Backspace "FF" files in print file.
BKSPRU,est,ss.	Backspace "SS" PRUs, on print file.
PRSIZE,est,ps.	Sets paper status "PS" to L (long) or S (short) paper size.
SKIP,est,rr.	Skips forward "RR" records on print file.
SKIPF,est,ff.	Skips forward "FF" files on print file.
SKIPPRU,est,ss.	Skips forward "SS" PRUs on print file.
REPEAT,est,yy.	Repeats current operation "YY" times on LP or CP.
REPRINT,est. or REPUNCH,est,yy.	Terminates current operation and re-enters file in its queue with priority "YY".
TRAIN,est,y.	Assigns print train identification.

NUMERIC IDENTIFIERS

AND FORMS CODES

CP,est,id.	
CP,est,id.	
LP,est,id.	Assigns Identifier id (Ø-67B) to the device.
LU,est,id.	
LR,est,id.	
LS,est,id.	
LT,est,id.	
FORM,est,fc.	Assigns a two character forms code "FC" to the device.
FORM,est,.	Removes the two character forms code.

PRINTER SUPPORT UTILITY (PSU)

PRINTER COMMANDS

- Same line printer commands as BATCHIO except that PSU's printer names are referenced under the K display of PSU.

  K,PSU's JSN.
  K.ON,PRINTØ1. for example

LAB 2

1. Assume a logical device used for temporary file is running out of space. Remedy the condition.

2. What channel are the tape units on?

3. Logically turn off a line printer.

4. What channel are the line printers on?

5. Assume a printer has jammed and lost several pages of a listing. Remedy the condition.

6. Assume a user calls and requests you get an additional three copies of his printer output. How would you do this?

LESSON 8

JOB PROCESSING

LESSON 8

JOB PROCESSING

Lesson Preface:

This lesson introduces the student to the scheduler and the commands available to control a particular job or class of jobs.

Objectives:

Upon completion of this lesson, the student will be able to:

- Control the execution of a class of jobs.
- Control the execution of a particular job.
- Send message to user.
- Send comments to jobs.
- Explain the S, Q and B displays usage.

Reference:

NOS 2 Analysis Handbook - Pub. No. 60459300

INTEGRATED SCHEDULER

- Unified Scheduler for mixed environments
- Operator control of scheduling parameters
- Dynamic Central Memory management
- Automatic Job swapping
- Improved terminal response time
- Improved batch throughput

JOB SCHEDULING QUEUES

- Three queue types per service class (SC)
  - Input Queue
  - Rollout Queue
  - Output Queue
- Queue parameters for each queue type (QT)
  - Lower bound priority
  - Upper bound priority
  - Entry priority
  - Weighing Factor

JOB ORIGIN TYPES

- Each Job Origin Type has valid job service classes defined for it

- Some routines check job origin for granting special privileges (SYOT), special input and output processing (IAOT), etc.

- Valid Job Origin Types (OT)

  - System Console (SYOT)

  - Local Batch (BCOT)

  - Remote Batch (EIOT/RBOT)

  - Time Sharing (TXOT/IAOT)

JOB SERVICE CLASSES

- Job scheduling is determined by a job's service class which is affected by the following:

  - Job's origin
  - User's validation
  - Job's priority
  - System defaults

- Valid (default) service classes are:

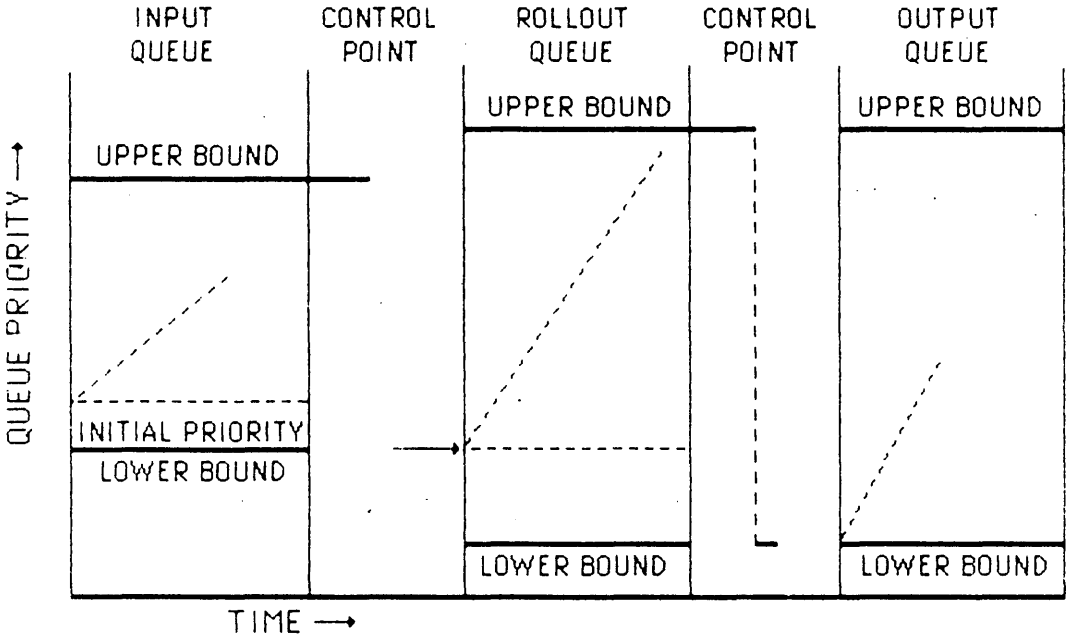
SYSC	System
BCSC	Batch
RBSC	Remote Batch
TSSC	Interactive
DISC	Detached Interactive
NSSC	Network Supervisor
SSSC	Subsystem
MASC	Maintenance
CTSC	Communciation Task
I0SC	Installation Class 0
I1SC	Installation Class 1
I2SC	Installation Class 2
I3SC	Installation Class 3

SCHEDULER TIME SLICES

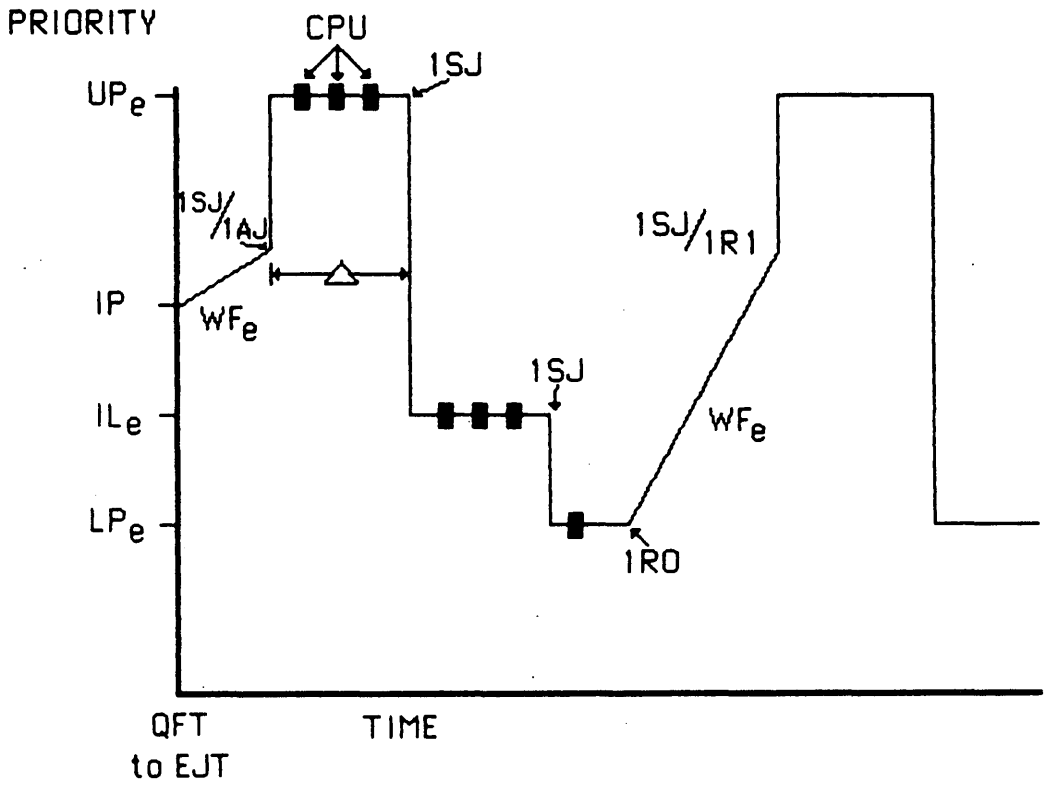
TIME SLICE = MINIMUM (CPU TIME SLICE, CM TIME SLICE)

- CPU Time Slice
  - CPU time slots accumulated
- Central Memory Time slice
  - Time at a control point

JOB SCHEDULING - LEAVING AND RE-ENTERING ROLLOUT QUEUE



CENTRAL MEMORY PRIORITY



The scheduler (1SJ) moves jobs from the Queue File Table (QFT) to EJT and sets the job's entry time so priority calculation is equal to Initial Priority (IP) time so priority calculation is equal to Initial Priority (IP) for its service class. As time elapses, its priority calculations increase until 1SJ selects it, assigns it to a control point, and sets its priority (entry time) to actual Upper Priority value for executing job (UPe) for its service class. The job runs at this priority until it exceeds its CPU or CM time slice. 1SJ then drops the priority (entry time) to the actual lower bound priority value used or initial slice of jobs (IL) for its service class and gives the job another whole time slice.

When the time slice expires, 1SJ drops the priority value to Lower bound Priority (LPe) value for executing jobs for its service class. The job may continue to execute this priority, but it is very likely that it will be rolled out. When it is rolled out, the rollout routine (1RO) will use priority value to calculate entry time. Its priority calculations will begin to increase until it is rolled in with priority value equal to Upper Priority (UPe) for executing jobs for its service class. The cycle (this paragraph only) will be repeated until job completes or aborts.

SCHEDULING COMMANDS

RELATED TO S DISPLAY

CLASS,ot,sc_1,sc_2,sc_n.	Defines one or more valid service classes "sc" for origin type "ot".
PCLASS,sc_0,sc_1,...sc_7.	Selects service class of sc_n to be associated with each priority level n. Priority levels are shown by the SCTD utility.
DELAY, p_1,p_2,...p_n.	Changes system delay parameters.
QUEUE,sc,qt, qp_1,..,qt_n.	Alters the priorities associated with the input,output and executing queue.
SERVICE,sc, p_1,p_2,...p_n.	Alters the service limits associated with each service class.

JOB PROCESSING CONTROL COMMANDS RELATING TO B, Q, AND R DISPLAYS

ROLLIN,jsn,L.	Rollin job JSN, if L is present the job is not available for rollout (EJT entries only).
ROLLOUT,jsn,n.	Rollout job JSN for "n" scheduler intervals ($\emptyset$-7777_8). If n is $\emptyset$ or omitted, job must be rolled in through operator action. (flagged with * on R display)
DROP,jsn.	Drops job JSN from the B or R display.
DROP,jsn,qt.	Drops job JSN from the specified queue type "QT".
DROP,qt,ujn.	Drops job with the User Job Name "UJN" from the specified queue type.
DROP,,qt.	Drop all jobs from specified queue.
ENQP,jsn,pppp.	Enter a queue priority "pppp" for specified jsn.
KILL,jsn.	Drop a job from the B or R display without exit processing.
RERUN, jsn.	Rerun a job from the beginning.
OVERRIDE,jsn.	Drop job regardless of job's queue priority. (does not apply to interactive origin jobs).

JOB PROCESSING CONTROL COMMANDS

CFO,jsn.comment.	Sends a comment from the operator (36 character maximum) into a job's field length and dayfile.
COMMENT,jsn.comment.	Puts a comment (49 character maximum) in a job's dayfile.
GO,jsn.	Clears pause bit for job.
GO,.	Used at deadstart to acknowledge system warning messages.
OFFSW,jsn,Sw_1,Sw_2,..Sw_n.	Turns off one or more sense switches (1-6) for job.
ONSW,jsn, Sw_1,Sw_2,..Sw_n.	Turns on one or more sense switches (1-6) for job.
PAUSE,jsn.	Sets pause bit for job.
DIAL,jsn,mesage.	Sends a message (48 character maximum) immediately to IAF terminal user JSN.
WARN,message.	Sends a message (48 character maximum) to all terminals currently logged into IAF. The message is received at a terminal upon completion of the current command. The message is also received by each subsequent IAF user at login time.
WARN,.	Clears message entered by WARN,message.

LESSON 9

TAPE SUBSYSTEM

LESSON 9

TAPE SUBSYSTEM

Lesson Preface:

This lesson introduces the student to the tape commands.

Objectives:

Upon completion, the student should be able to:

- Assign tape to jobs
- Label tapes
- Use the E,P. and E,T. displays

References:

NOS 2 Operations Handbook - Pub. No. 60459310

MAGNET

(MAGNETIC TAPE SUBSYSTEM)

- Executive (MAG)
- Job scheduling
- ANSI labels
- Compatible formats available for interchange

TAPE SCHEDULING FEATURES

- Automatic assignment by VSN/label
- Tape drive overcommitment
- Deadlock prevention
- Resource preview display (E,P.)
- Ring/no ring validity check (E,T.)

MAGNETIC TAPES

- 7-track tape
  - LO(200)
  - HI(556)
  - HY(800) CPI,NRZI
- 9-track tape
  - 800 CPI, NRZI (HD)
  - 1600 CPI, PE (PE)
  - 6250 CPI, GCR (GE)
- Recording modes
  - Binary mode
  - Coded mode
    + USASCII
    + EBCDIC
    + BCD
- Unlabeled tapes (LB=KU)
- Labeled tapes (LB=KL or LB=NS)
- VSN - Volume Serial Number
- Automatic assignment by VSN or label
- Logical tape files and physical tape reels
  - Single-tape files
  - Multi-tape files
  - Multi-file tapes
  - Multi-file multi-tape

DEFINITIONS

Unsatisfied (tape) job - A job that has not requested the number of tapes specified on its RESOURC card. A satisfied job has been assigned its maximum RESOURC card requirement.

Deadlock - Two or more satisfied jobs that cannot finish because they are waiting for a tape unit held by the other unsatisfied job, to become free. The tape unit cannot become free because neither job can continue to release a tape until the other job releases a unit.

For example, in an installation with six tape units, a DEADLOCK situation would exist if JOBA and JOBB were at control points, each with three tapes assigned, but both needed four units to continue.

6 TAPE DRIVES

JOBA	JOBB
Control Point 3	Control Point 4
RESOURC(MT=4)	RESOURC(MT=4)
LABEL,AA,MT.	LABEL,A,MT.
LABEL,BB,MT.	LABEL,B,MT.
LABEL,CC,MT.	LABEL,C,MT.
LABEL,DD,MT.	LABEL,D,MT.
ROLL OUT	ROLL OUT
AND WAIT	AND WAIT

At this point, neither job could continue without dropping the other.

If, however, JOBB had specified "MT3" on its RESOURC card, this would not be a DEADLOCK situation because, even though JOBA would have to wait, we know that JOBB could not request a fourth tape; therefore, it could continue to a point where it would release a tape. At this point, JOBA could continue.

DEFINITIONS (CONT)

Potential Deadlock - Two or more unsatisfied tape jobs that are requesting tapes in a situation where there would not be enough free units remaining to satisfy the maximum requirements of any of them.

Tape Scheduling Overcommitment:

Job scheduling algorithm - A job is brought to a control point and its request for a tape is displayed in the "P" display only if its maximum tape requirements are less than or equal to the number of "Potentially Free" tape drives.

Potentially free drives - Number of drives in the installation, minus total tape requirement of all active jobs, plus the number of drives held by satisfied jobs.

Deadlock prevention algorithm - The system will refuse the assignment of a tape to a job (even manual assignment) if that assignment creates a potential deadlock situation. This does not apply to System jobs.

TAPE COMMANDS

"E,P" AND "E,T" DISPLAYS

UNLOAD,est.	Unloads tape.
ASSIGN,jsn,est.	Assigns tape unit to control point.
VSN,est,vsn.	Assigns a (1-6 character) VSN to an unlabeled tape.
VSN,est.	Clears current VSN for unlabeled tape unit.
SCRATCH,est.	Declares a tape to be a scratch tape.
VSN,est,.	Declares an unlabelled tape to be a scratch tape.
X.BLANK(VSN=vsn)	Utility which writes ANSI standard label on tape. Documented in NOS References Manual, Volume 3.

LAB 3

1. Bring up the two displays that illustrates what tapes are mounted and which tapes are requested concurrently.

2. Change the VSN on a tape.

3. Assign a tape to a job.

4. Assign an unlabeled tape a VSN to match an entry in the E,P. display.

5. Clear the VSN of a labeled tape.

6. Assign a labelled tape as a scratch tape.

7. Bring up the display that illustrates:

   a. The jobs in all the queues
   b. The jobs in the Output queue
   c. The jobs in the Input queue
   d. The jobs current rolled out
   e. The upper priority that a batch job can age to while in the input queue.
   f. The rate at which a rolled out job ages
   g. The initial queue priority for a remote batch job the first time it goes to a control point

8. Allow no new batch job.

9. Increase the priority of executing jobs in the interactive service class to 7050.

10. Terminate a job without doing exit processing.

11. Terminate a job normally.

LESSON 10

DEADSTART

LESSON 10

DEADSTART

Lesson Preface:

This lesson introduces the student to the deadstart panel, the various options that are available, and the parameters that may be selected. Topics covered include; warmstart, panel settings, keyboard entries, modifying the existing system, and the various levels of recovery available.

Objectives:

Upon completion of this lesson, the student will be able to:

- Warmstart the system
- Modify the CMRDECK, IPRDECK, and APRDECK
- Modify the equipment configuration via EQPDECK entries
- Initiate various levels of deadstart
- Execute an express deadstart dump

Reference:

- NOS 2 Operations Handbook - Pub. No. 60459310
- NOS 2 Analysis Handbook - Pub. No. 60459300
- CYBER Initialization Package (CIP) User's Handbook - Pub. No. 60457180

Projects:

- Laboratory 2

DEADSTART

- What is it? System Initialization
  - Load CMR programs and read certain programs into the PPs
  - Set up or check CMR tables
  - Set up or check disk tables and files
- What is needed?
  - Deadstart file
  - Proper panel setting
  - Deadstart commands

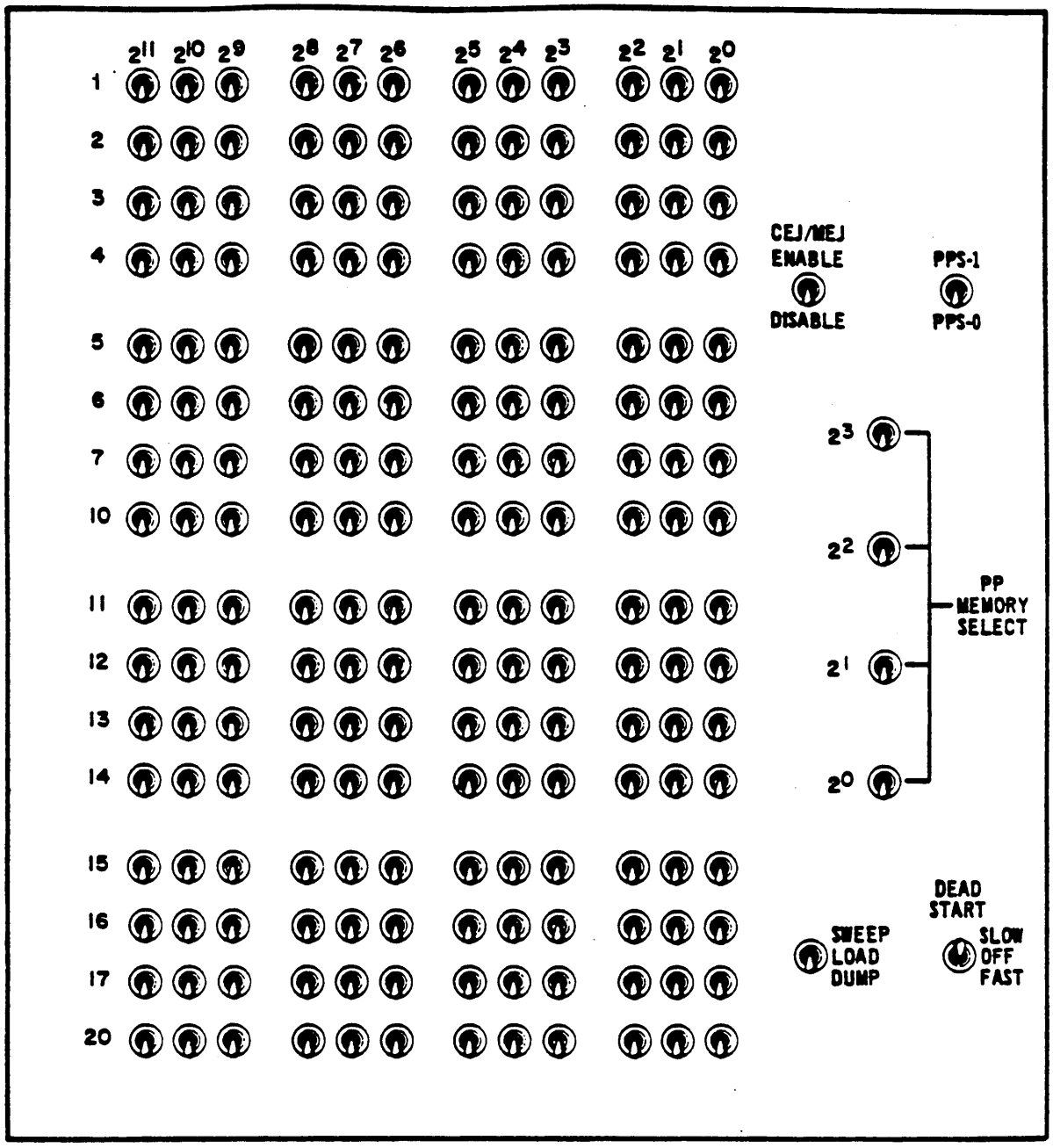
DEADSTART

Deadstart is the process that makes the system operational and ready to process jobs. System deadstart requires that you intervene occasionally. You initiate the deadstart procedure by momentarily activating the deadstart switch.

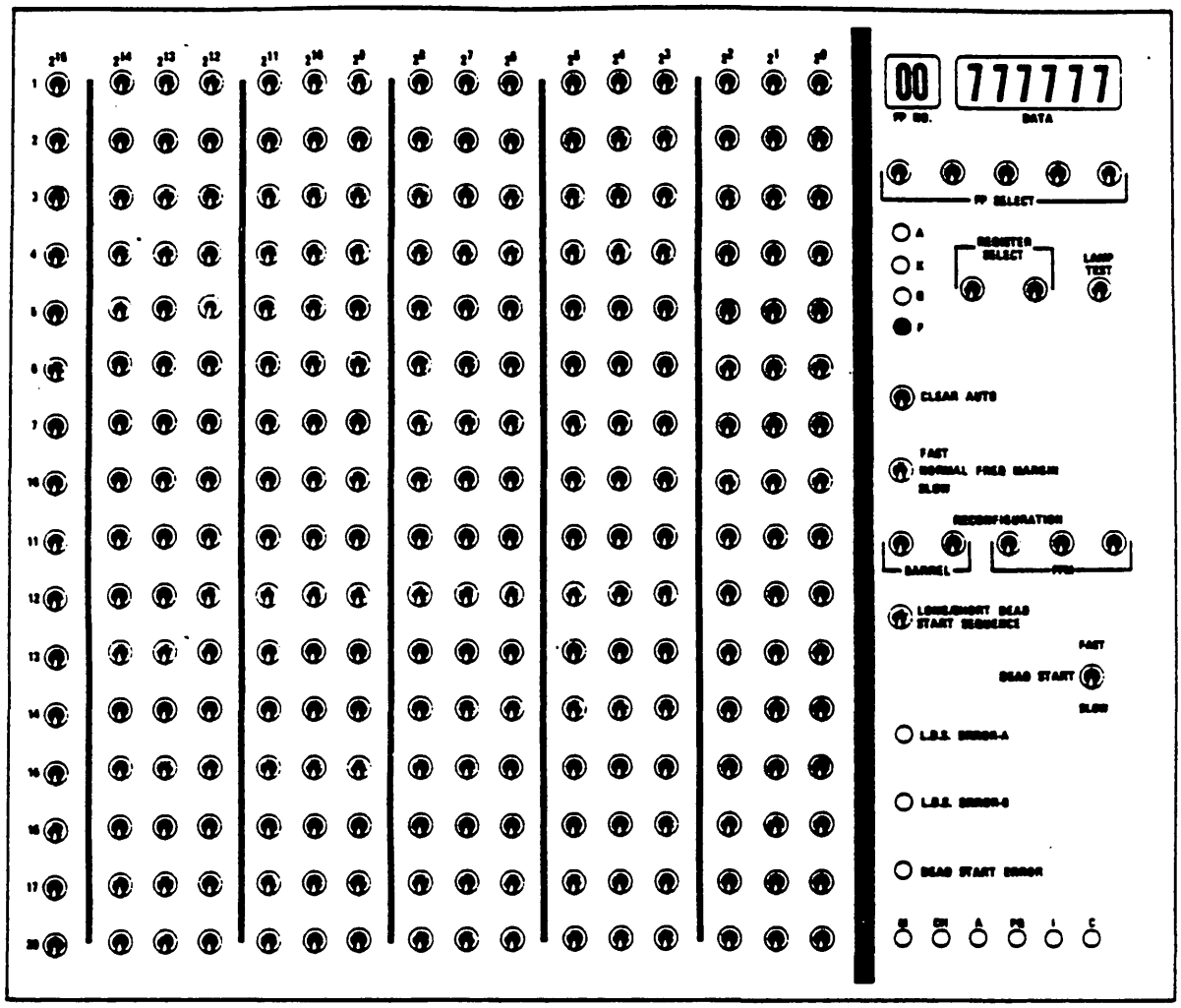
COLDSTART VERSUS WARMSTART

The coldstart procedure loads the tape and disk controller with controlware. The tape controlware can be loaded from a card reader or a tape unit depending on the type of controller.

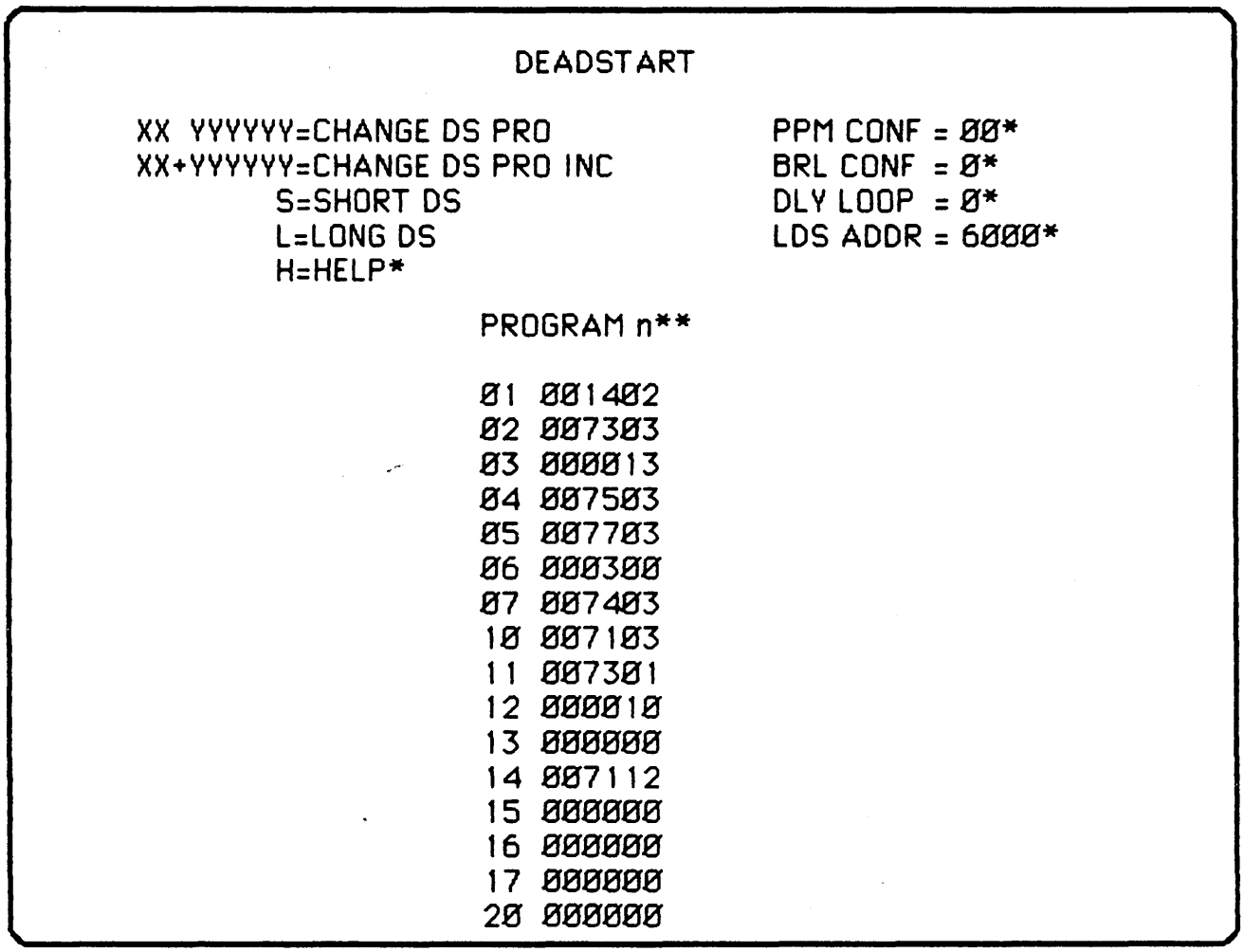
Warmstart is the deadstart procedure used when the controlware is loaded and functioning properly.



CYBER 170 DEADSTART PANEL



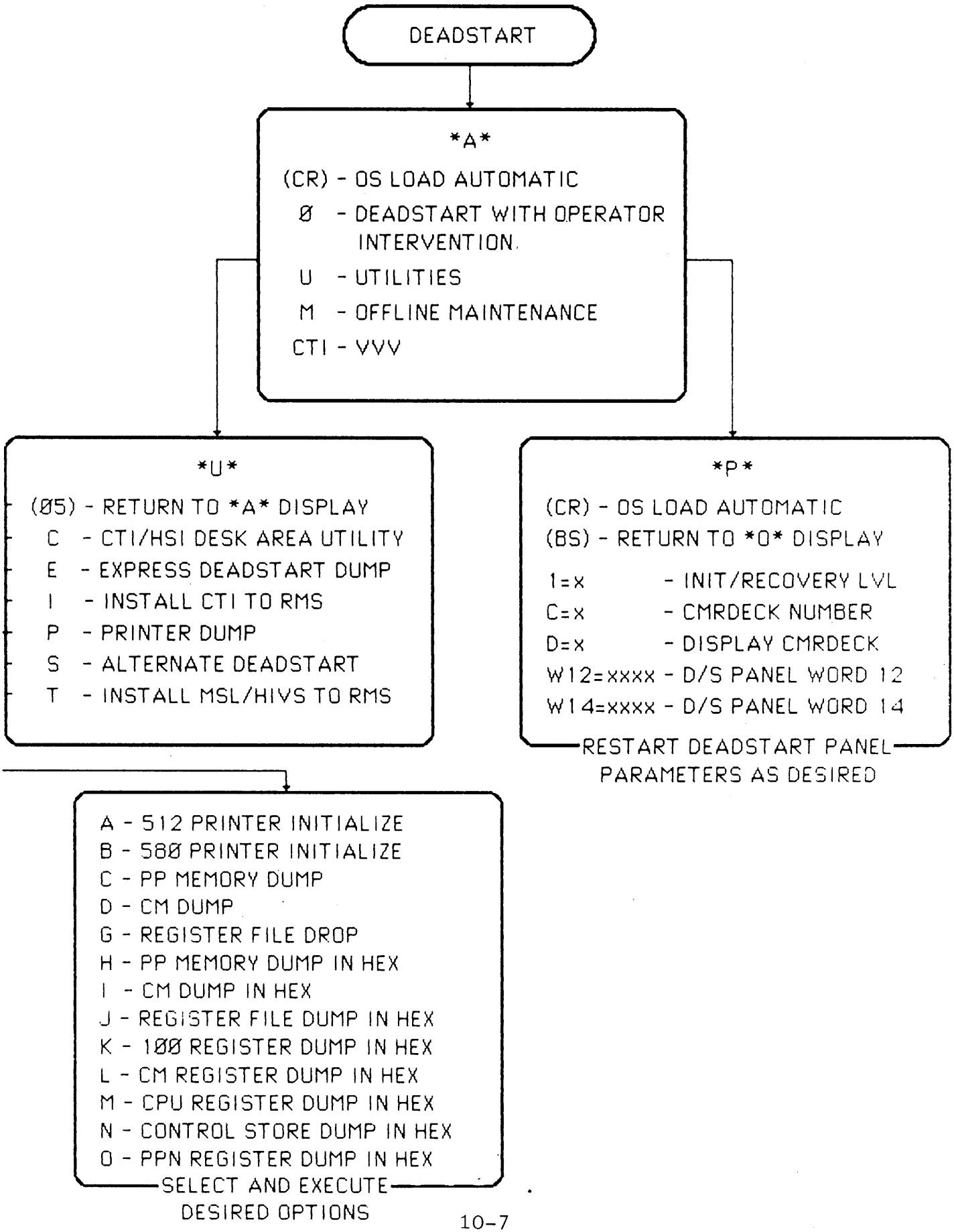
CYBER 170 MODELS 835, 845 AND 855 DEADSTART PANEL



* Refer to the CIP User's Handbook for explanation of these entries.

** n is the number of the most recently used deadstart program number; the program contents are those most recently used to deadstart.

INITIAL DEADSTART DISPLAY FOR CYBER 18Ø MODELS 81Ø AND 83Ø


DEADSTART
A
(CR) - OS LOAD AUTOMATIC
Ø - DEADSTART WITH OPERATOR INTERVENTION
U - UTILITIES
M - OFFLINE MAINTENANCE
CTI - VVV
U
(Ø5) - RETURN TO *A* DISPLAY
C - CTI/HSI DESK AREA UTILITY
E - EXPRESS DEADSTART DUMP
I - INSTALL CTI TO RMS
P - PRINTER DUMP
S - ALTERNATE DEADSTART
T - INSTALL MSL/HIVS TO RMS
P
(CR) - OS LOAD AUTOMATIC
(BS) - RETURN TO *O* DISPLAY
1=x - INIT/RECOVERY LVL
C=x - CMRDECK NUMBER
D=x - DISPLAY CMRDECK
W12=xxxx - D/S PANEL WORD 12
W14=xxxx - D/S PANEL WORD 14
RESTART DEADSTART PANEL
PARAMETERS AS DESIRED
A - 512 PRINTER INITIALIZE
B - 580 PRINTER INITIALIZE
C - PP MEMORY DUMP
D - CM DUMP
G - REGISTER FILE DROP
H - PP MEMORY DUMP IN HEX
I - CM DUMP IN HEX
J - REGISTER FILE DUMP IN HEX
K - 100 REGISTER DUMP IN HEX
L - CM REGISTER DUMP IN HEX
M - CPU REGISTER DUMP IN HEX
N - CONTROL STORE DUMP IN HEX
O - PPN REGISTER DUMP IN HEX
SELECT AND EXECUTE
DESIRED OPTIONS

DEADSTART LEVELS

Level Ø
- System loaded from DS file
- Preserved files recovered

Level 1
- System restored from checkpoint file
- Jobs and files recovered from checkpoint file
- Successful CHECKPOINT SYSTEM
- All mass storage intact and magnetic tapes in use by jobs are still positioned.
- CMRDECK entries same as last Level Ø or match reconfigurations (if any)

Level 2
- System loaded from DS device
- Jobs and files recovered from checkpoint file
- Successful CHECKPOINT SYSTEM
- All mass storage intact and magnetic tapes in use by jobs are still positioned.
- CMRDECK entries same as last Level Ø or match reconfigurations (if any)

LEVEL 3 DEADSTART

Level 3

- System, FNT, MST/TRT, low core CMR and control points recovered from central memory
- FNT, MST/TRT, low core CMR and control points must be intact
- Jobs at control points restarted (rerun)
- CMRDECK entries same as last Level Ø or match reconfigurations (if any)
- Abort Recovery Option

RECOVERY DEADSTARTS WHEN NOT?

Level Ø

Level 1
- Unsuccessful checkpoint system
- Running after checkpoint system
- Unsuccessful Level 3
- MREC

Level 2
- Same as for Level 1

Level 3
- After Level Ø, 1, 2, is not successful
- MREC has been run for this machine
- If memory has been destroyed

RECOVERY DEADSTARTS WHEN?

Level Ø
- Initial deadstart
- Restart from unsuccessful Level 3
- After MREC

Level 1
- Controlled idle down by checkpoint system
- Allow scheduled interruption of production for maintenance or "systems time"

Level 2
- Controlled idle down by checkpoint system
- Systems test situations

Level 3
- Equipment malfunction hang
- System hang
- Recover abort processing

SYSTEM CONFIGURATION

The system configuration is the identification and grouping of peripheral devices used by the mainframe. These peripheral devices include disk drives, tape drives, line printers, controllers, network processing units, and so forth. The identification and grouping of these devices is defined in four types on the deadstart file; the CMRDECK, the EQPDECK, the APRDECKs, and the IPRDECK.

SYSTEM DEFINITON

The CMRDECK, EQPDECK, APRDECKs, and IPRDECK files together define the system configuration and set the initial operating system limits and priorities.

Each of these files can exist in many versions on the deadstart file. You specify which CMRDECK and EQPDECK to use during a level Ø (initial) deadstart. (On level 3 deadstarts, the CMRDECK and EQPDECK specified during the last level Ø deadstart remains in effect.) APRDECK specifies which APRDECK is needed. If an APRDECK is not specified, a default APRDECK (usually APRDØØ) is supplied. One of the entries in the CMRDECK is a command that specifies which IPRDECK is required for this particular system configuration. Thus, by specifying a particular DMRDECK and EQPDECK, you can also select the unique combination of APRDECKs and IPRDECK needed to deadstart the system.

All of these files are prepared by site analysts during the installation process. You do not interact with these files unless there is an error or you elect to display the CMRDECK during deadstart. You control when the CMRDECK is displayed during deadstart by the setting of bit 6 in word 13 of the deadstart panel.

If the display CMRDECK switch is set in the up position, the system halts after CTI has completed and displays the CMRDECK. The CMRDECK, the EQPDECK, the APRDECKs, and the IPRDECK can be viewed and changed.

LEVEL 1 OR 2 RECOVERY DEADSTART

- All system activity should have closed before deadstarting and all mass storage checkpoints should have been completed.

- The following is a sequence to take a checkpoint:

UNLOCK.	
ONSW,IAF,1.	If time sharing subsystem is up
IDLE,IAF.	or STOP,IAF.
K,NAM.	Use NAM's K display to bring down network K.AP=NVF K.IDLE,HOST. or K.DISABLE,HOST.
IDLE.	Do not allow any new jobs into memory (NOTE: only enter after NAM is no longer active)
CHECKPOINT SYSTEM	Writes contents of memory to disk
E,M.	Check for DEVICE checkpoint (c in display)
STEP.	Deadstart if and only if no C's on E,M. display, or else UNSTEP and try STEP again.

CMRINST
INSTRUCTIONS FOR INITIAL SETUP OF THE OPERATING SYSTEM.
USE + KEY TO SEE NEXT PAGE.

NEXT. WILL CAUSE THE LOAD TO CONTINUE.
IPR. WILL CONTINUE THE LOAD TO THE *IPRDECK* DISPLAY.
GO. WILL CONTINUE THE LOAD WITHOUT FURTHER DISPLAYS.
THE RIGHT BLANK KEY ADVANCES THE DISPLAY.

CLT=N. SET CLT LENGTH = N OCTAL ENTRIES.
N=Ø-1ØØB. DEFAULT IS Ø.
EJT=N. SET EJT LENGTH = N OCTAL ENTRIES.
N=3-77777B. DEFAULT IS 62ØB
EQP=NN. ASSEMBLE EQUIPMENT PARAMETER DECK EQPDNN.
NN=ØØ-77B. DEFAULT IS SAME NUMBER AS CMRDECK.
FNT=N. SET FNT LENGTH = N OCTAL ENTRIES.
N=3-7777B. DEFAULT IS 23B.
FOT=N. SET FOT LENGTH = N OCTAL ENTRIES.
N=3-1ØØB. DEFAULT IS 1ØB.
IPD=NN. ASSEMBLE INSTALLATION PARAMETER DECK IPRDNN.
NN=ØØ-77B. DEFAULT IS FIRST IPRDECK FOUND.
LIB=NN. BUILD SYSTEM USING LIBDECK LIBONN.
NN=ØØ077B. DEFAULT IS LIBDOO.
LIDT=N. SET THE MAXIMUM NUMBER OF LIDS ALLOWED = N.
N=Ø-144B. DEFAULT IS 5.
MID=MM. SET MACHINE IDENTIFIER = MM.
MM=TWO ALPHANUMERIC CHARACTERS. DEFAULT IS AA.
NIMCM=N. SET THE MINIMUM AMOUNT OF CENTRAL MEMORY = N HUNDRED OCTAL WORDS. THE ACTUAL AMOUNT OF MEMORY USED AS CENTRAL MEMORY WILL BE PHYSICAL SIZE - UEM SIZE.
N=ONE TO FOUR DIGIT OCTAL VALUE.
N=ONE TO FIVE DIGIT OCTAL VALUE FOR 8X5 MODELS.
DEFAULT AND MINIMUM IS 14ØØB (49K).
NAME=CC-CC. SET THE SYSTEM NAME = CC-CC.
CC-CC IS .LE. 38 ALPHANUMERIC CHARACTERS.
NCP=N. SET THE NUMBER OF CONTROL POINTS = N.
N=2-34B. DEFAULT IS 12B.
OPSECM=N. SET THE SECURITY MODE OF THE SYSTEM.
N=Ø-3 (SECURITY MODE).
DEFAULT IS Ø (UNSECURED MODE).
PPB=N. SET NUMBER OF 1Ø2B WORD CM BUFFERS FOR BUFFERED I/O DEVICE TRANSFERS = N.
N-1-17B. DEFAULT IS 1.
PPU=P1,...,PN. TOGGLES ACTIVE STATUS OF THE PHYSICALLY AVAILABLE PP-S, EXCEPT FOR PP-S Ø, 1, 2 AND 1Ø.
PN=3-7, 11B, AND 2ØB-31B. * TOGGLES THE STATUS OF PP-S 2ØB. DEFAULT IS ALL PP-S ACTIVE.
QFT=N. SET QFT LENGTH = N OCTAL ENTRIES.
N=3-7777B. DEFAULT IS 62ØB.
VERSION=CC-CC. SET VERSION NAME = CC-CC.
CC-CC IS .LE. 18 ALPHANUMERIC CHARACTERS.

```
EQPINST
   INSTRUCTIONS FOR EQUIPMENT DEFINITON.
   USE + KEY TO SEE NEXT PAGE.

   NEXT. WILL CAUSE THE LOAD TO CONTINUE.
   IPR. WILL CONTINUE THE LOAD TO THE *IPRDECK* DISPLAY.
   GO. WILL CONTINUE THE LOAD WITHOUT FURTHER DISPLAYS.
   THE RIGHT BLANK KEY ADVANCES THE DISPLAY.

   LBC,CT,CQ,C2,...,CN.
        LOADS CONTROLWARE RECORD TYPE *CT* ON DISK CHANNELS
        C1,C2,...,CN.
        CT = CONTROLWARE TYPE TO LOAD.
             HT = LOAD HALF TRACK CONTROLWARE.
             NH = DO NOT LOAD HALF TRACK CONTROLWARE.
             FT = LOAD FULL TRACK CONTROLWARE.
             NF = DO NOT LOAD FULL TRACK CONTROLWARE.
             FM = LOAD FMD CONTROLWARE.
             NM = DO NOT LOAD FMD CONTROLWARE.
             AD = LOAD FSC ADAPTOR COTNROLWARE.
             NA = DO NOT LOAD FSC ADAPTOR CONTROLWARE.
             PH = LOAD HSIO CONTROLWARE.
             NP = DO NOT LOAD HSIO CONTROLWARE.
             NN = DO NOT LOAD NAD CONTROLWARE.
        CN = CHANNELS TO LOAD.
   RESET=X1,X2,...,XN.
        RESET CHARACTERISTICS FOR EQUIPMENT WITH EST ORDINALS
        X1,X2,...,XN. ONLY THE EQUIPMENT INFORMATION ENTERED
        YIA THE *EQXXX=* COMMAND WILL BE RETAINED.
   XM=MID,IIII,UUUU,EM.
        ALLOCATE EXTENDED MEMORY.
        MID  = MACHINE ID.
        IIII  = HIGH SPEED DISK BUFFER SPACE/1ØØØB.
        UUUU = USER EXTENDED MEMORY SPACE/1ØØØB.
        EM   = FORCES USER EXTENDED MEMORY TO UEM IF SPECIFIED
               (8XX SERIES MAINFRAMES ONLY).
   XM=MID.
        CLEAR ALLOCATION FOR MACHINE *MID*.

   THE FOLLOWING ENTRIES DEFINE DAYFILE RESIDENCE AND CM
   BUFFER SIZE.  IF EQUIPMENT IS DELETED (EQXXX=Ø.), RESET OR REDEFINED, THE DAYFILE
   RESIDENCE IS RESET TO THE DEFAULT (NULL EQUIPMENT).

   ACCOUNT=XXX,BL.      ACCOUNT DAYFILE.
   DAYFILE=XXX,BL.      SYSTEM DAYFILE.
   ERRLOG=XXX,BL.       ERRLOG DAYFILE.
   MAINLOG=XXX,BL.      MAINTENANCE LOG.
        XXX = EST ORDINAL (DEVICE CANNOT BE REMOVABLE).
        BL = CM BUFFER LENGTH (DEVICE MUST BE A MULTIPLE OF 1ØØB.

   THE FOLLOWING ENTRIES MUST BE MADE AFTER THE EQUIPMENT HAS
   BEEN DEFINED. IF EQUIPMENT IS DELETED (EQXXX=Ø.), RESET
   OR REDEFINED, THEN THESE DEFINITIONS ARE CLEARED AND MUST
   BE REENTERED AFTER NEW EQUIPMENT IS DEFINED.

   XQ, X2,...,XN = EST ORDINALS OF EQUIPMENT.
```

```
ACCESS,LLVL,ULVL,X1,X2,...,XN.
     SET SECURITY ACCESS LEVEL LIMITS ON X1, X2,...XN.
     LLVL = ACCESS LEVEL NAME FOR THE LOWER LIMIT.
     ULVL = ACCESS LEVEL NAME FOR THE UPPER LIMIT.
ASR=X1,X2,...,XN.
     DEFINE X1,X2,...,XN AS ALTERNATE SYSTEM DEVICES.
FAMILY=XXX.
     DEFINE EQUIPMENT WITH EST ORDINAL *XXX* AS THE
     DEFAULT FAMILY.
INITIALIZE,OP,X1,X2,...,XN.
     INITIALIZE MASS STORAGE DEVICES X1,X2,...,XN.
     OP = INITIALIZATION OPTION.
          AL = TOTAL INITIALIZE.
          AF = INITIALIZE ACCOUNT DAYFILE.
          DF = INITIALIZE SYSTEM DAYFILE.
          EF = INITIALIZE ERRLOG DAYFILE.
          FP = FORMAT PACK (AUTOMATIC SELECTION OF *AL*).
          MF = INITIALIZE MAINTENANCE LOG.
          PF = INITIALIZE PERMANENT FILES.
          QF = INITIALIZE QUEUED FILES.
ISHARE=X1,X2,...,XN.
     DEFINE X1,X3,...,XN AS INDEPENDENT SHARED DEVICES.
MSAL,TY,X1,X2,...,XN.
     ALLOW ALLOCATION TYPE *TY* ON X1,X2,...,XN.
     (XN MUST BE .LT. 60B).
     TY = B FOR *LGO FILES.
          D FOR USER DAYFILES.
          I FOR INPUT FILES.
          L FOR LOCAL FILES.
          O FOR OUTPUT FILES.
          P FOR PRIMARY FILES.
          R FOR ROLLOUT FILES.
          S FOR SECONDARY ROLLOUT FILES.
          T FOR TEMPORARY FILES.
PF=XXX,F,DM,SM,FM,DN,NC.
     DEFINE EQUIPMENT WITH EST ORDINAL *XXX* AS A PERMANENT
     FILE FAMILY DEVICE.
PF=XXX,X,PN,NC.
     DEFINE EQUIPMENT WITH EST ORDINAL *XXX* AS A PERMANENT
     FILE AUXILIARY DEVICE.
     APPLIES IF INITIALIZE,AL,XXX. IS USED.
     DM = DEVICE MASK (0-377B).
     SM = SECONDARY MASK (0-377B).
     FM = FAMILY NAME (1-7 ALPHANUMERIC CHARACTERS).
     PN = PACK NAME (1-7 ALPHANUMERIC CHARACTERS).
     DN = DEVICE NUMBER (1-77B).
     NC = CATALOG TRACKS (POWER OF 2 .LE. 200B).
REMOVE=X1,X2,...,XN.
     DEFINE X1,X2,...XN AS REMOVABLE DEVICES.
SHARE=X1,X2,...XN.
     DEFINE X1,X2,...XN AS SHARED DEVICES.
     THIS ENTRY IS NOT ALLOWED FOLLOWING *PRESET*.
```

EQ=N.	EQUIPMENT (CONTROLLER) NUMBER. N = Ø-7.
FC=XX.	FORMS CODE. XX = 2 ALPHANUMERIC CHARACTERS (AA-99).
HT=N.	LENGTH OF HASH TABLE SEGMENT. N = 1ØB-4ØØB, MUST BE A POWER OF 2.
ID=N.	IDENTIFIER. N = Ø-67B.
MA=XX.	MAINTENANCE MDOE (EM HALF SIZE). XX = ON OR OFF.
MC=N.	ESM SIDE DOOR PORT CHANNEL NUMBER. N = Ø013B, 2Ø-33B.
MI=N.	MSA MSID. N = Ø-17B.
ND=N.	NPU NODE NUMBER. N = 1-37B.
PI=N.	PIP INDEX. N = 1-4.
PS=X.	PAPER SIZE. X = S OR L.
PT=N.	PORT NUMBER OR NUMBER OF PORTS. N = Ø-7 IF *TY* IS *CS* OR *CT*. = Ø OR 1 IF *TY* IS *RM*. = 1-1ØØØØB IF *TY* IS *TT*.
SA=XX.	SYSTEM AUTOSTART MODULE (SAM) FLAG. XX = ON - *SAM* IS PRESENT. XX = OFF - *SAM* IS ABSENT.
ST=XX.	DEVICE STATUS. XX = ON OR OFF.
SZ=N.	EXTENDED MEMORY SIZE. N = 4ØØB, 1ØØØB, 2ØØØB, 4ØØØB, OR 1ØØØØB IF ECS 1, ECS 2, ESM OR LCME. = 1ØB = (1ØØØØB-MINCM) IF UEM.
TF=XXX.	TAPE FLAG. XXX = ATS - 67X (ATS) UNIT. = FSC - FSC UNIT. = MTS - 66X (MTS) UNIT. = ATSGE - ATS UNIT/GE CAPABILITY. = FSCGE - FSC UNIT/GE CAPABILITY.
TN=N.	PRINTER WITH TRAIN CARTRIDGE N. N = Ø-7.
UI=N.	UNIT MSID. N = Ø-377B.
UN=U1/.../UN.	UNIT NUMBER(S).
UN=U1-UN.	(HORIZONTALLY CONTIGUOUS UNITS) N = Ø-77B.
WØ=N.	EST ENTRY WORD Ø (2Ø OCTAL DIGITS).
W1=N.	EST ENTRY WORD 1 (2Ø OCTAL DIGITS).

TY	REQUIRED KEYWORDS	OPTIONAL KEYWORDS
CC	EQ,CH	ST
CP	EQ,CH	ST,ID,FC
CR	EQ,CH	ST,ID
CS	EQ,UN,CH,CI,MI,UI,PT	ST
CT	EQ,UN,CH,CP,MI,UI,PT	ST
DA	UN,CH	ST,AP
DB	UN,CH,HT	ST,AP
DE	SZ	ST,MA,ET,AP,MC
DI	UN,CH	ST,AP
DJ	UN,CH	ST,AP
DK	UN,CH	ST,AP
DL	UN,CH	ST,AP
DM	UN,CH	ST,AP
DP	SZ,CH	ST,MA,ET,AP,MC
DQ	UN,CH	ST,AP
DY	UN,CH,HT	ST,AP
DW	UN,CH,HT	ST,AP
DX	UN,CH	ST,AP
DY	UN,CH	ST,AP
DZ	UN,CH	ST,AP
LP	EQ,CH	ST,ID,FC,TN,PS
LQ	EQ,CH	ST,ID,FC,TN,PS
LR	EQ,CH	ST,ID,FC,TN,PS
LS	EQ,CH	ST,ID,FC,TN,PS
LT	EQ,CH	ST,ID,FC,TN,PS
MP	CH	ST
MT	EQ,UN,CH,TF	ST
NC	CH	ST
NP	EQ,CH,PI,ND,SA	ST
NT	EQ,UN,CH,TF	ST
RM	CH,PT	ST
TT	EQ,CH	ST,PT
**	W0	W1

K1,...,KN ARE THE FOLLOWING KEYWORDS -

AP=N.	APRDECK NUMBER. N = 0-77B.
CH=C1/.../CN.	CHANNEL NUMBER(S). CN = 2, 4 OR 6 IF *TY* IS *DY* OR *DW*. = 15B IF *TY* IS *RM*. = 0-13B, 20-33B FOR ALL OTHER TYPES.
CI=X.	CSU IDENTIFIER. X = A-M.
CP=N.	POSITION OF MST ON THE CSU. N = 0-3.

```
ET=MT/PT.                    EXTENDED MEMORY TYPE (DEFAULT = E1/D1).
                             MT = MEMORY TYPE.
                                  E1 = ECS 1.
                                  E2 - ECS 2.
                                  LE - LCME.
                                  EM - UEM.
                                  ES - ESM.
                             PT = PATH TYPE (*DP* EQUIPMENT ONLY).
                                  D1 - DC135 DDP.
                                  D2 - DC145 DDP / ESM LOW SPEED PORT.

    SYSTEM=X1,X2,...,XN.
        DEFINE X1,X2,...,XN AS SYSTEM DEVICES.
        ALL EQUIPMENTS SPECIFIED MUST BE OF THE SAME TYPE.
        *MXSY* (5) SYSTEM DEVICES MAY BE DEFINED.
        (XN MUST BE .LT. 40B).
    PRESET,N.
        PRESET LINK DEVICE FOR MULTI-MAINFRAME OPERATION.
        N = OPTIONAL PARAMETER SPECIFYING MAXIMUM NUMBER OF
        SHARED DEVICES (N .LT. 377B).
    PRESET=X1,X2,...,XN.
        PRESET INDEPENDENT SHARED DEVICES X1,X2,...,XN.

    DEADSTART OPTIONS.

    AUTOLOAD.
        DISABLE AUTOLOADING OF BUFFER CONTROLLERS.
    GRENADE.
        SELECT GRENADE OPERATION AFTER AUTOLOADING.
    EST DEFINITION

    EQXXX=TY,K1=V1,...,KN=VN.  DEFINE EQUIPMENT EST
    ORDINAL *XXX* AS FOLLOWS.

    TY = DEVICE TYPE (2 CHARACTERS)

    MASS STORAGE -
    DE = EXTENDED MEMORY          DP = DDP/EXTENDED MEMORY
    DI = 844-21, HALF TRACK       DK = 884-21, FULL TRACK
    DJ = 844-41/44, HALF TRACK    DL = 844-41/44, FULL TRACK
    DM = 885-11/12, HALF TRACK    DQ = 885-11/12, FULL TRACK
    DV = 819, SINGLE DENSITY      DW = 819, DOUBLE DENSITY
    DX = 3330-1, FULL TRACK       DY = 3330-11, FULL TRACK
    DZ = 3350, FULL TRACK         DA = 33502, FULL TRACK
    DB = 885-42, FULL TRACK

    UNIT RECORD -
    FOR LINE PRINTERS, EQXXX=TY-P SPECIFIES A 580 PFC
    PRINTER.

    CP = 415 CARD PUNCH           CR = 405 CARD READER
    LP = ANY LINE PRINTER         LQ - 512 LINE PRINTER
    LR = 580-12 LINE PRINTER      LS = 580-16 LINE PRINTER
    LT = 580-20 LINE PRINTER
```

OTHER -
FOR MAGNETIC TAPES, EQXXX=TY-N SPECIFIES *N* CONSECUTIVE
EST ENTRIES BEGINNING AT EST ORDINAL *XXX*.

CC = 6683 SATELLITE COUPLER	CS = MSS CARTRIDGE SELECTOR
CT = MSS CARTRIDGE TRANSPORT	MP = MAP III
MT = 7-TRACK MAG TAPE DRIVE	NC = NETWORK ACCESS DEVICE
NP = 255X NETWORD PROCESSING UNIT (NPU)	NT = 9-TRACK MAG TAPE DRIVE
	RM = TWO PORT MUX
TT = TIME-SHARING MUX	** = NONSTANDARD EQUIPMENT

```
APRINST
INSTRUCTIONS FOR ENTERING DISK FLAWS.

BELOW IS A LIST OF ENTRIES WITH WHICH TO SET TRACK
FLAWS IN TRTS.

TRACK RESERVATION ENTRIES.

CTK.                    CLEAR PREVIOUS RTK, STK AND TTK ENTRIES.
STK=NNNN.               SET RESERVATION ON LOGICAL TRACK NNNN.
TTK=NNNN.               TOGGLE RESERVATION ON LOGICAL TRACK NNNN.
RTK=AIIIIII.            RESERVE ECS BLOCK, ADDRESS AIIIIII.
RTK=AIIIIIII-AJJJJJJ.           RESERVE ECS BLOCK FROM ADDRESS IIIIIII
                                TO JJJJJJJ.
TKF=CNNN,TBB,SCC.       RESERVE 819 TRACK.
RTK=CNNN,TBB,SCC.       RESERVE 819 TRACK.
     CNNN = CYLINDER NNN.
     TBB  =  HEAD GROUP BB.
     SCC  =  SECTOR CC.
```

QUIZ 6

1. What is the deadstart panel and what is its function?

2. A PP instruction is how many bits long?

3. What word is set to change the deadstart device?

4. The following are examples of word 13 settings.
   What do they mean?

   a) 011 000 000 000

   b) 000 011 010 001

   c) 011 001 000 001

   d) 000 010 000 000

5. In an 800 series machine deadstart panel, what function does word 12 have?

6. In doing an alternate device deadstart, what sequence of displays is used?

7. In doing a printer dump to dump a portion of central memory, what steps are taken?

8. On an 800 series mainframe, what is the difference between long and short deadstart sequences?

9. What mainframe or mainframes have no deadstart panel?

QUIZ 6 (cont.)

10. What is WARMSTART?

Indentify the following:

1. Express deadstart dump

2. CMRDECK

3. Control Store

4. APRDECK

5. IPRDECK

6. CTI

7. Deadstart file

8. EQPDECK

9. HIVS

10. Deadstart

LABORATORY OUTLINE

1. Perform a level 0 deadstart.

   a. Display the CMRDECK, EQPDECK, APRDECK and IPRDECK.

   b. Make changes to the CMRDECK, and EQPDECK (to be supplied by instructor)

2. Take the system down.

3. Re-deadstart doing a level 0 from an alternate device.

4. Take the system down gracefully as if it were in production.

5. Take an express deadstart dump to tape.

6. Assume a PP hung, bring the system up.

7. Take a system checkpoint.

8. Bring the system back into operation.

LESSON 11

UTILITIES

LESSON 11

UTILITIES

Lesson Preface:

This lesson introduces the student to some of the system utilities that are available to the operator. Topics discussed include: loading, dumping, and copying permanent files; loading, dumping, moving, recovering, listing, and changing queued file characteristics; and dumping, listing, and terminating dayfiles.

Objectives:

Upon completion of this lesson, the student should be able to:

- Dump permanent files
- Load permanent files
- Dump input/output queues
- Load input/output queues
- Recover input/output queues
- Change characteristics of a queue file
- Dump system day files
- List system day files

Reference:

NOS 2 Analysis Handbook - Pub. No. 60459300

PERMANENT FILE UTILITIES

PFDUMP	Dump permanent file to an archive file.
PFLOAD	Load permanent file from an archive file.
PFCOPY	Copy archive file(s) to a local file(s)
PFCAT	Produce a catalog directory of permanent file on a device
PFATC	Produce a catalog directory from an archive file

CALLING THE UTILITIES

Permanent file utility operations can be initiated through console input to a K display, card input (batch), or terminal entry. However, for batch or terminal input, the user must be validated for system origin privileges and the system must be in DEBUG mode.

CONSOLE INPUT

Input from the console requires the following sequence of entries and responses:

1. Call PFS by typing:

   ```
   X.PFS.
   ```

   under DIS after assigning an archive (if required).

   The B display indicates the job sequence name (jsn) of PFS. To the right of the entry appears the following message:

   ```
   REQUEST *K* DISPLAY
   ```

2. Activate the right K display for HELP information by typing:

   ```
   KK.
   ```

3. Activate the K display for that control point by typing:

   ```
   K,jsn.
   ```

   (jsn is the Job Sequence Name of PFS specified on the B display)

4. Choose options.

5. Initiate execution by typing:

   ```
   K.GO.
   ```

PROCEDURE FILES

Calling the PF utilities can be made simpler with site defined procedure files. If these procedures are defined on file PROCFIL under user name SYSTEMX (user index 377777₈), they can be called by operator entry from DSD. Since user name SYSTEMX is valid only from system origin jobs, the file PROCFIL should be write-permitted to another user name; this will allow easier maintenance of site defined procedures.

For example, when called in the following manner, the procedure DUMPIT provides a full dump of device 1 of the system default family on archive tapes with VSNs of PFB11, PFB12, ..., PFB16.

```
S.BEGIN(DUMPIT,,DEVICE=1,SET=B)
```

The SETJOB command is used to set the UJN of the job so that the banner page indicates the dump operation performed. In this case it is FULL 1B.

```
.PROC,DUMPIT,DEVICE=Ø,LISTOP=E,SET=A.

SET JOB,UJN=FULL_DEVICE_SET.

VSN,TAPE=PF_SET_DEVICE_1/PF_SET_DEVICE_2/PF_SET_DEVICE_3/

PFPF_SET_DEVICE_4/PF_SET_DEVICE_5/PF_SET_DEVICE_6.

LABEL,TAPE,D=GE,PO=W,W,FI=$FULL DUMP$.

PFDUMP,DN=DEVICE,LO=LISTOP.
```

Parameters for the Permanent File Utilities

Refer the the NOS 2 Analysis Handbook for the parameter options accepted by each permanent file utility. An X in the table of parameter options is accepted; a blank indicates that the parameter option is not accepted.

QUEUE/DAYFILE UTILITIES

Several utility programs provide control over queued input, print, wait, and punch file and over system, account, binary maintenance log, and error log dayfiles.

- There are ten utilities under the control of the queue file supervisor program QFSP. These utilities select for processing queue files or dayfiles that share certain user-specified characteristics such as device residence, origin type, and job sequence name.

- The dayfile dumping utilities are four independent utilities that dump all or selected parts of the active system, account, error log, or binary maintenance dayfiles. These utilities each process the contents of a single file according to user-specified criteria.

QUEUE FILE UTILITIES

The names and functions of the queue file utilities follow.

Utility	Description
QREC	Deactivates or activates selected queued files; purges inactive queued files.
QLIST	Lists inactive queued files.
QDUMP	Dumps queued files to tape or mass storage.
QLOAD	Loads queued files from tape or mass storage.
QMOVE	Moves queued files from one mass storage device to another.
LDLIST	Lists queued files present on a QDUMP dump tape/file.
QALTER	Alters routing information associated with active queued output files; purges active queued files.
QFTLIST	Lists detailed information about active queued files.
DFTERM	Terminates an active or inactive dayfile and retains it as a direct access permanent file.
DFLIST	Lists dayfiles that have been made permanent files by the DFTERM utility.

CALLING THE QUEUE FILE UTILITIES

All queue file utility operations, except for DFLIST, LDLIST, and QLIST, can be initiated through console input to a K display. All queue utilities except DFLIST, QALTER, QFTLIST, DFLIST and QALTER operation can be initiated only through direct keyboard entries. However, in all cases, for batch and terminal input, the user must be validated for system origin privileges, the console must be in DEBUG mode and the user must observe certain parameter order dependencies. Since LDLIST, QDUMP and QLOAD require preassignment of the dump file, only DIS, batch, or terminal input is appropriate for these utilities.

CONSOLE INPUT

Input from a console through a K display requires the following sequence of entries and responses. These procedures do not apply to DFLIST, QLIST, or LDLIST, because K displays aare not available for these utilities.

1. Call QFSP by typing:

   ```
   X.QFSP.
   ```

   under DIS after assigning a tape (if required).
   The B display indicates the job sequence name of QFSP. To the right of the entry appears the following message:

   ```
   REQUEST *K* DISPLAY
   ```

2. Activate the K display for that control point by typing:

   ```
   K,jsn.
   ```

   (jsn is the Job Sequence Name of PFS specified on the B display)

3. Activate the right K display for HELP information by typing:

   ```
   KK.
   ```

4. Choose options.

5. Initiate execution by typing:

   ```
   K.GO.
   ```

TYPES OF DAYFILES

Account Dayfile	Records all resources charged to a job and is used for customer billing.
Binary Maintenance Log	Records information used in maintenance in a binary format.
Error Log Dayfile	Records system error messages.
Job Dayfile	Records entries for individual jobs.
System Dayfile	History of all commands for all jobs processed.

DAYFILE COMMANDS

X.DFD.	Dump system dayfile.
X.AFD.	Dump accounting file.
X.ELD.	Dump the error log file.
X.MAINLOG.	Dump the Binary Maintenance Log.
X.GETLOG	Dumps the ERRLOG and Binary Maintenance Log for use by the Custom Engineering HPA/NORML utilities.

LESSON 12

SECURITY

LESSON 12

SECURITY

Lesson Preface:

This lesson introduces the student to the concept of security available in NOS. Topics covered are the commands available and restrictions they impose.

Objectives:

Upon the successful completion of this lesson, the student will be able to:

- Define operating system modes.
- Describe Security Administration capability.
- Define restrictions at different security levels.

References:

- NOS 2 Security Administration Handbook - Pub. No. 60460410
- NOS 2 Analysis Handbook - Pub. No. 60459300

OVERVIEW

NOS Multi-Level Security is based upon two mechanisms for ensuring the privacy of a set of data, mechanisms in addition to the standard NOS privacy mechanisms. These are (1) hierarchical security access levels, and (2) security categories (often referred to as "compartments"). The access level and category(s) of a set of data are attributes of that data, determined and defined by the owner of the data in accordance with applicable security policy.

Some of the major features are:

- Provision of eight hierarchical access sensitivity levels for classification of data and other system resources.

- Provision of thirty-two security categories (compartments) for classification of permanent files.

- Mandatory access control and flow control policy enforcement.

- Separate passwords for interactive and batch use.

- Password encryption.

- User password expiration terms.

- Permanent file PERMIT expiration terms.

- Overwrite (clearing) of directly accessible mass storage files.

- Classified output labeling.

- Clearing of storage after job rollout

OPERATING SYSTEM MODE

There are defined two modes of operation of the NOS Operating System: the secured mode and the unsecured mode.

In the secured mode, a user may access the same files with the added constraint of access levels and access categories.

In the unsecured mode, a user may access all his files and other users' files for which explicit/implicit permission had been given him.

SECURITY ACCESS LEVELS

Tight security access levels are available for the classification of data, ranging from Ø, the lowest (unsecured or unclassified) level, to 7, the highest level. These levels are hierarchical, level "x" being defined as less sensitive than level "x+1." The creator, or owner, of the data file - permanent file, local file, or magnetic tape - may assign an access level to that fiel depending upon the owner's individual validations and upon operating system constraints. Alternatively, the owner may allow the file's access level to be assigned automatically by the operating system.

SECURITY CATEGORIES

In addition to the eight access levels, there are thirty-two categories available for the classification of data. The owner of a permanent mass storage data file may assign any or all of the thirty-two categories to that file, depending upon the owner's individual validations and upon operating system constraints.

Like security access levels, it should be noted that it is also the responsibility of the owner of a permanent file to determine the security category(s) appropriate for the data in accordance with the privacy and security policies applicable to the data contained within the file.

MANDATORY SECURITY

In conjunction with the formal security access level and category designations associated with classified data (the "mandatory" classification designations), there is a corresponding set of formal clearances which users must have in order to access classified information. Compromise is defined as "the disclosure of classified information to persons not authorized access thereto." A user may not obtain access to classified information if the user is not cleared to the classification level of the information. Otherwise, that information would be compromised.

A requirement of the above is that classification labels associated with sensitive data cannot be arbitrarily changed, since this could permit individuals who lack the appropriate clearance to access classified information. An additional requirement is that the system must control the flow of information so that data from a higher classification cannot be placed in a storage object of lower classification unless its "downgrading" has been authorized.

OPERATING SYSTEM ACCESS LIMITS

Control of access to the operating system when the system is in the secured mode (OPSECM CMRDECK entry equal to 1, 2, or 3) is accomplished by setting the highest and lowest security access levels that are allowed in the system. These levels are referred to as the system access limits. They define an inclusive range of access levels: no job may execute at an access level below the lower bound or above the upper bound. Similarly, no file or device may be accessed below the lower bound or above the upper bound.

OPERATING SYSTEM ACCESS LIMITS (CONT)

Options available are described below:

OPSECM=n Sets the operating system security mode to the value "n." The values of "n" are as follows:

Ø Sets the system to the unsecured mode. This is the default value and is selected when the OPSECM CMRDECK entry or parameter value is omitted.

1 Multi-level security is enabled. The value(s) of the system access level limits may be set either by the SECURES IPRDECK entry or by console command. The SECURES console command may be used to either raise or lower system access level limits.

2 Multi-level security is enabled. The value(s) of the system access level limits are set by the SECURES IPRDECK entry. The SECURES console command may be used to raise but not to lower system access level limits.

3 Multi-level security is enabled. The value(s) of the system access level limits are set by the SECURES IPRDECK entry only; the SECURES console command is invalid.

ORIGIN TYPE ACCESS LIMITS

In addition to the operating system access limits, access limits may be defined for each origin type. The system access limits are by definition the access limits for System origin. Unless redefined by deadstart IPRDECK entry or by console command, all origin type limits will be the same as the system access limits.

This feature will be useful for limiting, for instance, interactive jobs to be certain range of access levels while batch jobs are permitted a greater range of access levels.

The access limits defined for an origin type other than System (which set the system access limits) must lie within the system access limits. If the system access limits are reset with the SECURES,SY command, all origin type limits will also be reset.

EQUIPMENT ACCESS LEVEL LIMITS

In a secure system, access level limits may be assigned to individual equipment. The access level limits define the lowest and highest access levels of data that may be written to or read from that equipment.

MASS STORAGE DEVICE ACCESS LEVEL LIMITS

When a mass storage or ECS device is initialized, the access level limits of data permitted to reside on the device will be recorded in the MST in the device label. No files may be assigned to that device which have access levels outside the device access level limits. Existing files on the device may not have their access levels changed to levels outside the access level limits.

SECURITY ADMINISTRATOR

Although the operator can be considered cleared for normal system cotnrol functions, there are certain system control functions which are more sensitive in a multi-level security system environment. These include the ability to change users' validations, to modify system security control parameters, or to directly interrogate or alter user programs or data.

In order to provide a higher, more sensitive level of access to system control, NOS Multi-Level Security will use the concept of Security Administrator Privilege, a validation privilege for the individual in the user validation file. This privilege will allow an installation to designate a certain individual or individuals as security administrator(s) in accordance with the installation security procedures. Those system control functions which require this privilege are described in various portions of this document.

See lesson on Modval for other user validations.

SECURED SYSTEM CONTROL COMMANDS

The following commands are allowed on a secured system.

OQSH=level.

Specifies the output queue special handling level on a secured system. The output queue special handling level is set initially during deadstart by the OQSH IPRDECK entry. Output files with an access level greater than or equal to the output queue special handling level specified in this command are not printed but remain in the queue until released by the operator (refer to Release command).

If level is set to the lowest access level or no level is specified, no files are held in the queue.

RELEASE,jsn.

Allows the operator to release a file from the output queue whose level is equal to or above the output queue special handling level on a secured system. Other restrictions based on device access levels and file access levels set by your site continue to apply.

SECURES,ot,LA=lowerlevel,UA=upperlevel.

Sets the system access level limits (ot=SY) or the origin type access level limits for a particular origin type (ot=IA, BC, or RB). The system access level limits determine the range of access levels allowed in the system; jobs may not execute at an access level outside this range, and files may not be created or accessed at an access level outside this range. Origin type access level limits determine the range as it applies to jobs of one particular origin type. By default, all origin type access level limits are the same as the system access level limits.

The options available for using this command to change the system limits (that is, whether they can be raised, lowered, or both) are controlled by the OPSECM CMRDECK entry. The origin type access level limits for ot=IA, BC, and RB can be changed to any values within the system access level limits.

When the system access level limits are changed (ot=SY), all origin type access level limits are reset to the new system limits.

The parameters LA and UA specify the lower and upper access level limits. Both parameters must be specified. The access level value corresponding to the lower access level must be less than or equal to the access level value corresponding to the upper access level.

SECUREQ,est,LA=lowerlevel,UA=upperlevel.

Sets equipment access levels.

UNLOCK,username,password.

Unlocks the console keyboard. When this command is active, the message SECURITY UNLOCK appears in the header on the left screen display. The following commands are restricted to entry only when the console is in security unlock status.

DEBUG.
DIS,jsn.
ENABLE,ENGR.
ENABLE,RDF.
QDSPLAY,jsn.
SECURES,ot,LA=lowerlevel,UA=upperlevel.
SECUREQ,est,LA=lowerlevel,UA=upperlevel.
All memory entry commands.
All memory display commands.
DATE. yy/mm/dd.
TIME.hh.mm.ss.

LESSON 13

NETWORK COMMANDS

LESSON 13

NETWORK COMMANDS

Lesson Preface:

This lesson introduces the student to Network Access Methods (NAM). NAM initializes and controls the 255X Network Processing Units (NPU's), trunks, lines, terminals, and application programs under network supervision.

Objectives:

At the completion of this lesson, the student should be able to:

- Initialize the network
- Enable/disable the various elements in the network
- STATUS the various elements in the network
- Send messages to various elements in the network

Reference:

- NOS 2 Operations Handbook - Pub. No. 60459310
- NOS 2 Analysis Handbook - Pub. No. 60459300

TERMS ASSOCIATED WITH NAM

NAM Network Access Method - Acts as an interface between the host computer application programs at one end and the terminals at the other end.

NCF Network Configuration File - Establishes the configuration of NPU's, trunks, and logical links in the network.

NS Network Supervisor - Loads CCP into the NPU's. Establishes the logical linkages through which messages are transmitted and received to and from the terminals for each application program.

HOP Host Operator - Controls the network elements (NPU's, trunks, and logical links) by communicating with NS.

LCF Local Configuration File - Establishes the applications, lines, and terminals in the network.

CS Communication Supervisor - Coordinates the network activities of the host computer and all its communication elements. Establishes logical connection between the application programs and the terminals as they become available.

NOP Network Operator - Controls applications and communication elements (lines and terminals) by communication with CS.

CCP Communications Control Program - The software program of the NPU.

DOP Diagnostic Operator - Monitors and tests communication lines.

NPU Network Processing Unit - A communications controller that transmits data between a terminal an a host computer.

CLA Communication Line Adapter - Communication ports which match the characteristics of the NPU and the device it is connected to.

MDI Mainframe Device Interface - CDCNET's host interface device.

TDI Terminal Device Interface - CDCNET's terminal interface device.

TERMS ASSOCIATED WITH NAM (CONT)

NVF Network Validation Facility - Provides login access security. Verifies the user name, family name, and password. Upon successful login, causes the Communication Supervisor (CS) to notify the application program (identified in the login) that a terminal requests connection. NVF also performs switching between application programs and terminal disconnection. NVF will perform automatic application selection whenever the terminal is allowed to access only one application. NVF will not allow more than one terminal with the same user name to log into RBF.

NETWORK ORGANIZATION

The network consists of couplers, lines, logical links, NPU's, terminals, and trunks connected to the host computer by a channel.

- A CHANNEL is a data channel on which a peripheral device controller can be accessed.

- A COUPLER is a hardware element that links an NPU to a channel.

- A LINE is the circuit that connects a terminal to an NPU.

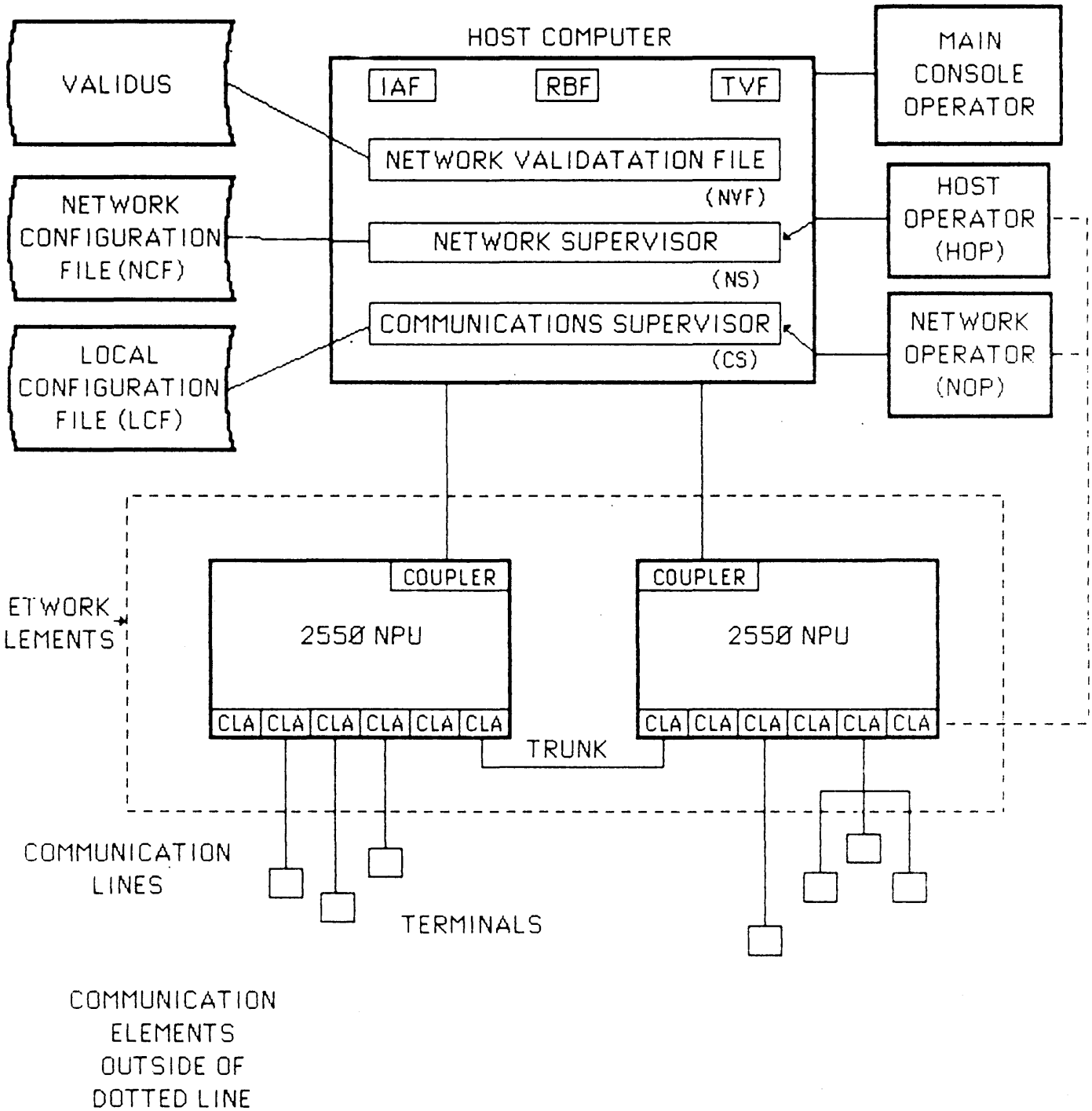
- A LOGICAL LINK is a logical path connecting a coupler and an NPU or two couplers.

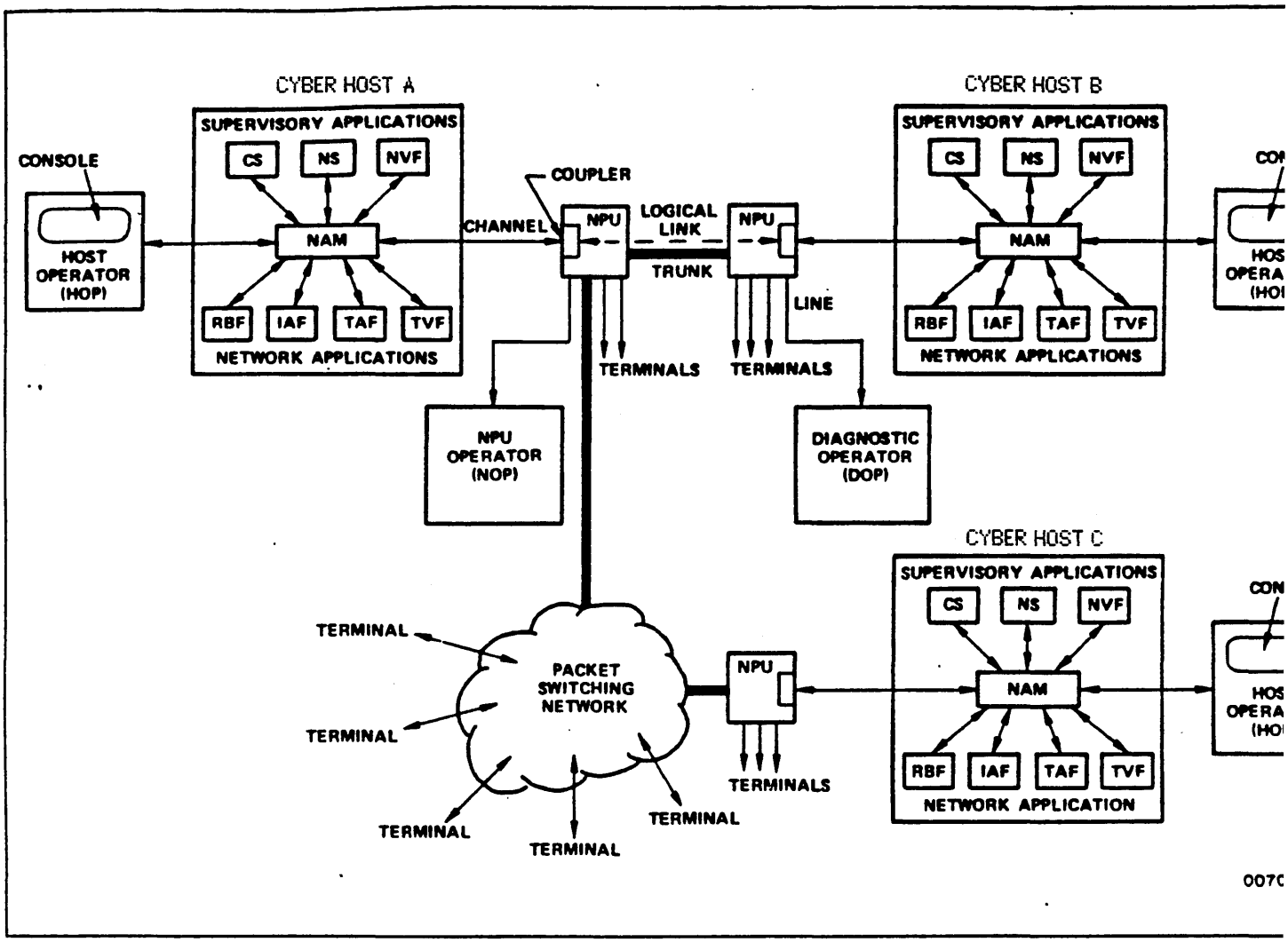
- An NPU is the communications controller that transmits data between terminals and a host computer or between two host computers.

- A PUBLIC DATA NETWORK is an X.25 packet switching network (PSN). Terminals, NPU's and foreign hosts can be connected to a PSN to exchange data.

- A TERMINAL is a device by which a user supplies input messages to, and accepts output messages from, an application program.

- A TRUNK is the communication line connecting two NPU's.


HOST COMPUTER
VALIDUS
IAF
RBF
TVF
MAIN CONSOLE OPERATOR
NETWORK VALIDATATION FILE
(NVF)
NETWORK CONFIGURATION FILE (NCF)
NETWORK SUPERVISOR
(NS)
HOST OPERATOR (HOP)
COMMUNICATIONS SUPERVISOR
(CS)
NETWORK OPERATOR (NOP)
LOCAL CONFIGURATION FILE (LCF)
ETWORK LEMENTS
COUPLER
2550 NPU
COUPLER
2550 NPU
CLA CLA CLA CLA CLA CLA
CLA CLA CLA CLA CLA CLA
TRUNK
COMMUNICATION LINES
TERMINALS
COMMUNICATION ELEMENTS OUTSIDE OF DOTTED LINE



Sample Network

N A M

- Communicate through the K display
  - NAM Mode
  - Application Mode
- Start Up (Type)
  - NAM or NAMxxxx.
- Shutdown (Type):
  - K. APPL=NVF.
  - K.IDLE,HOST. (graceful shutdown) or
  - K. DISABLE,HOST.

NAM COMMANDS

- The following commands entered under NAM K display allows the operator to get the status, enable, and disable an application, NPU, terminal, user, coupler, line, logical link, trunk, or network.

  STATUS

  DISABLE

  ENABLE

LABORATORY 3

1. On your (live) system, dump a user index to tape (your instructor will decide which).

2. Run a PFCAT on all devices.

3. Do a QDUMP.

4. Do a QFTLIST.

5. Dump the system dayfile based on criteria provided by your instructor.

6. Bring up the network.

7. Status lines and terminals.

8. Bring the network down.

LESSON 14

REMOTE HOST FACILITY

LESSON 14

REMOTE HOST FACILITY

Lesson Preface:

This lesson introduces the student to the Loosely Coupled Network (LCN) and the subsystem Remote Host Facility (RHF). RHF initializes and controls the LCN.

Objectives:

At the completion of this lesson, the student should be able to:

- Initialize RHF.
- Control the LCN process on his machine

References:

NOS Version 2 Analysis Handbook - Pub. No. 604593100.

REMOTE HOST FACILITY (RHF) K DISPLAY

The Remote Host Facility (RHF) links NOS to a loosely coupled network (LCN) providing transfer of permanent files, queued files, and maintenance facilities for the LCN hardware. Each system in an LCN configuration is connected to one or more LCN trunks by network access devices (NADs). Several types of NADs are available, allowing the connection of various types of computer systems to an LCN. Each system has an RHF that provides some or all of the following capabilities.

RHF runs at a control point and contains an operator interface package, control tables, and a network application code, and the PP routines that drive the RHF network hardware.

The following applications are also available as part of RHF:

Application	Description
PTF,PTFS	Permanent file transfer facility (PTF) and permanent file transfer facility servicer (PTFS). PTF and PTFS provide users access to remote permanent files. A local user activates PTF with the MFLINK command. When a remote user enters the MFLINK command, RHF activates a PTFS application on the local host to service the remote request.
MLTF	Maintenance log transfer facility (MLTF). MLTF provides maintenance logging capabilities for local and remote mainframe NADs. All local NAD errors are logged to the binary maintenance log (BML). All remote mainframe errors that have error logging enabled log errors. This application starts automatically when RHF is initiated.
QTF,QTFS	Queue file transfer facility (QTF) and queue file transfer facility (QTFS). QTF and QTFS allow the user to transfer input and output files to a remote system. When RHF is initiated, the system automatically activates QTF. When a remote host QTF application has a file to transfer, RHF initiates QTFS on the local host to service the remote request.

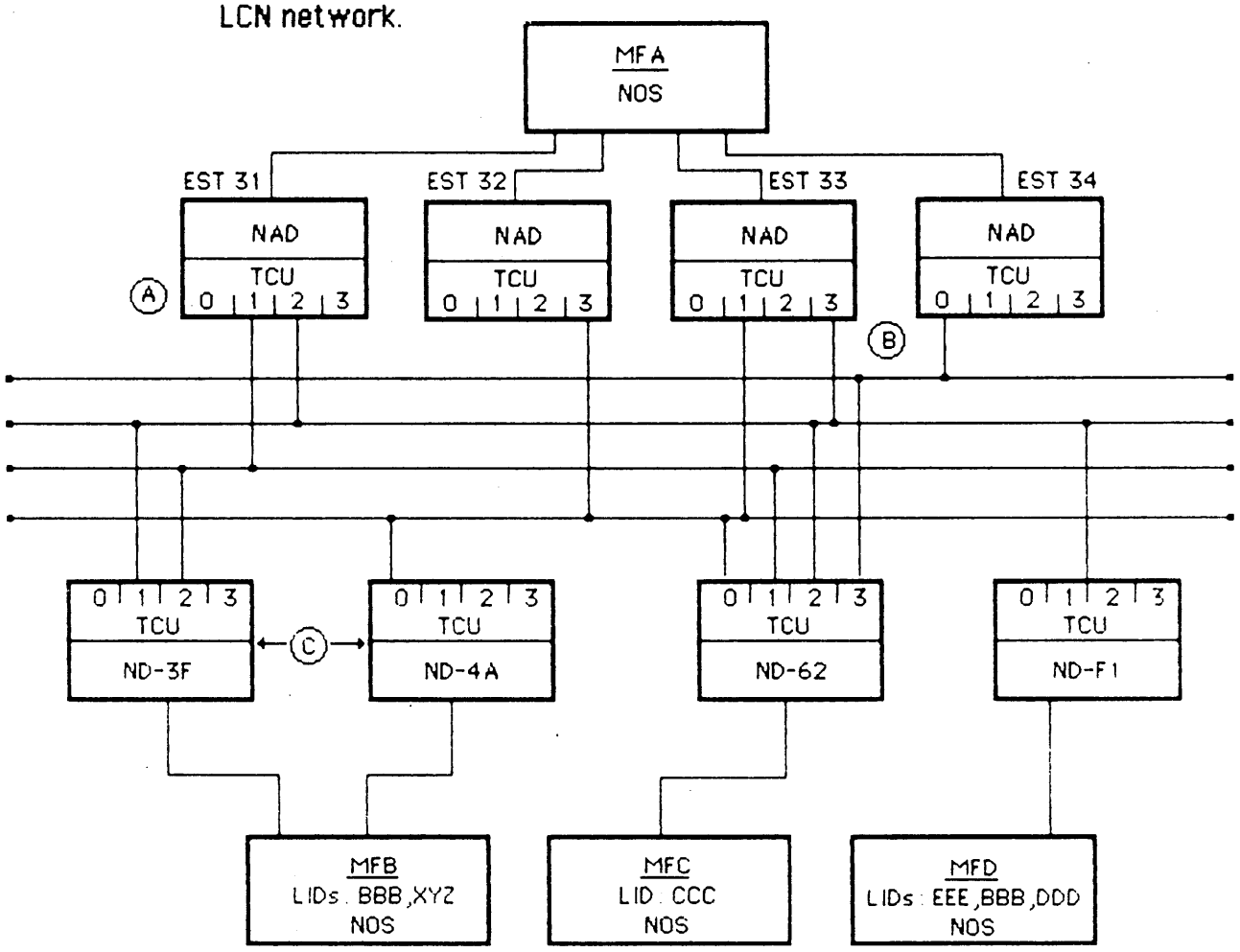
After initiation, both QTF and MLTF periodically roll in to check for files to transfer or to log NAD errors.

OPERATOR INTERFACE

- The operator interface for RHF consists of using the following displays.

DISPLAY	DESCRIPTION
Application Table	Lists all active applications.
Network ID Table	Lists the logical and physical identifiers of the remote host.
Network Path Status	Shows how the remote host is connected to the local host.

- An example of each display is shown later. To understand how to use the information provided in the displays it is helpful to understand the sample LCN network.



MFA is the local NOS host and MFB, MFC, and MFD are the remote NOS hosts. MFA has four EST ordinals set up during installation (EST 31, 32, 33, and 34) to be used with the three remote hosts. Each NAD can connect to a maximum of four channels which can be used to communicate with NADs. These Trunk Control Units (TCUs) are represented by the numbers Ø, 1, 2, and 3 in the diagram. (A)

The horizontal lines between the NADs of the local mainframe (MFA) and the NADs of the remote mainframe (MFB, MFC, and MFD) depict the connections between the NADs. For example, the top horizontal line shows the connections between the channels starting at TCU Ø of the local host and TCU 3 of the remote host. (B)

Also during the installation process each remote NAD is given a remote NAD address to uniquely identify that particular NAD. For example, the remote host MFB has two NADs associated with it. Their remote NAD addresses are 3F and 4A. (C)

RHF COMMANDS UNDER K DISPLAY

Use the RHF K display to communicate with RHF. Bring up this display with the following DSD commands.

```
K,RHF.
KK.          For HELP information.
```

The following commands are available under RHF the K display:

Command	Description
APPL	Displays the application table.
ID	Displays the network identification table.
IDLE	Begins the idle down process of RHF and all its associated applications.
PATH	Displays the network path status.
ord,ND=rna AC=rnac,DD=dd RT=rteb,LT=lteb, LOG=status	Modify entries associated with path ordinal ord.
+	Pages the current display forward.
-	Pages the current display backward.

LESSON 15

SPECIAL DISPLAYS/UTILITIES

LESSON 15

SPECIAL DISPLAYS/UTILITIES

Lesson Preface:

This lesson will review some of the utilities which are available via the K and L displays.

Objectives:

After completing this lesson, the student will be able to:

- Initialize a mass storage device
- Reconfigure a mass storage device on-line
- Explain the contents of the RBF
- Display a queue file
- Identify valid service classes according to origin type

Reference:

- NOS 2 Operations Handbook - Pub. No. 60459310
- NOS 2 Analysis Handbook - Pub. No. 60459300

K DISPLAYS

CYBERLOG	Gathers information of system's performance
Flaw	Disk flaw mapping
*Initialize	Disk initialization
Machine Recovery	Multi-mainframe device recovery
*Redefine	On line reconfiguration
*Remote Batch Facility	RBF subsystem
Transaction Facility	TAF subsystem

L DISPLAY

This L display is like the existing K display. The operator must start the program by typing the name of the utility. When L display is ready for use, DSD assigns it to the left screen automatically.

Using the display you can run any utility program you have created. The L display is an interface between your program and DSD.

All entries must be prefixed by L period (L.). However, when pressing CR after the first entry, everything but the L. is erased. This allows another command to be entered without entering L. first.

After you call a specific utility, the first command is entered in the following format.

L.commandstring.

commandstring is any input (command, data, or parameter) that is defined by the job as valid input.

You can execute your installation's own L display utility by entering the following command

LDISopt.

opt The last three characters of the installation defined utility called LDIS opt.

L DISPLAYS

*FOTD	Displays family ordinal table (FOT)
*LIDOU	Displays logical identifier table (LID)
*QDSPLAY	Displays the contents of a file in the queued file table (QFT).
*SCTD	Displays the contents of the validated service class for each origin type.
*SUBSYST	Displays subsystem information.

LESSON 16

DISPLAY (DIS) OPERATION

LESSON 16

DISPLAY (DIS) OPERATION

Lesson Preface:

This lesson describes the display operation (DIS) of a single job at a control point.

Objectives:

Upon completion of this lesson, the student will be able to:

- Start and stop a DIS job
- Initiate a DIS job that was halted

Reference:

NOS 2 Analysis Handbook - Pub. No. 60459300

OPERATION UNDER DIS CONTROL

DIS displays information about a single job. Under DIS, the B display shows the exchange package area for the job. Central memory addresses relative to the Job's reference address are used for the data program displays.

Initiate DIS at a control point to monitor the progress fo a job with any of the following methods.

- Command in the form DIS (job must be system origin or have system origin privileges).

- On an unsecured system, before you can call DIS, the console must be unlocked. When the system display console shows UNLOCK status, you can call DIS by entering the command:

  DIS,jsn.

  where jsn is the job sequence name to which you want DIS assigned.

- On a secured system, before you can call DIS, the console must be unlocked by the security administrator.

  When the system display console shows SECURITY UNLOCK status, you can call DIS by entering the command:

  DIS,jsn.

  where jsn is the job sequence name to which you want DIS assigned.

- You can call to DIS by typing X.DIS. This brings DIS to an empty control point to initiate a program.

  The operator may become any user by entering a USER command with appropriate username password and family.

DISPLAY SELECTION

xy. Brings the x and y displays to the left and right screens respectively.

The right screen display must be B, C, D, T, or U.

Letter Designation	Display	Description
A	Dayfile	Dayfile message and files attached to the job.
B	Job status	Job status, messages, commands and exchange package.
C,D	Data storage	Five groups of four octal digits with display code translation.
F	Data storage	Four groups of five octal digits with display code translation.
G	Program storage	Four groups of five ocal digits per group with COMPASS mnemonic translation.
H	Job local files	Local file name table entries for this job.
M	Extended memory	Five groups of four octal digits per group with display code translation.
T,U	Text display	Displays text from central memory in coded lines.
V	Central memory buffer	Displays 512 words directly from central memory..
Y	Monitor functions	Displays mnemonics and values of all monitor functions.
Z	Directory	Lists available DIS displays.

CONSOLE OPERATION

Unlike DSD, DIS is not interpretive. You must complete every type-in and signal DIS to act upon the message by pressing CR. The following rules apply to all DIS commands.

- Spaces in an octal field are ignored byt can be inserted for readability.

- All octal fields are right-justified with a leading zero fill; excess octal digits are ignored.

SPECIAL KEYS

*	If DSD has relinquished the maindisplay console to DIS, * acts as a quick hold, and DIS drops the display channel so that DSD can use it.
+	Advances by 40 octal locations the address of any of the following displays: C, D, F, G, M, T, and U on the left screen.
-	Decrements by 40 octal locations the address of any of the following displays: C, D, F, G, M, T, and U on the left screen.
(	Breakpoint program to (P + 1).
)	Breakpoint program to (P - 1).
/	Advances left screen memory display address by the value in the lower 18 bits of the first word displayed (applicable only to memory displays C, D, F, G, and M).
.	Sets AUTO MODE (initiates automatic command processing). This key performs the same function as the RCS command described under DIS Keyboard Entries in this section.
8	Advances the pointer indicating the first address of managed table for the left screen (applicable only to memory displays C, D, F, and G).

9	Decrements the pointer indicating the first address of managed tables for the left screen.
Right blank (display key)	Advances the left screen display sequence established by the SET,screen.command (refer to Display Selection Commands).
CR (carriage return)	Sets repeat entry flag; message REPEAT ENTRY is displayed on the error message line of the left screen. The subsequent command entry is processed each time the carriage return key is pressed. To clear the repeat entry mode, press the left blank (erase) key.

The following keys are interpreted as control characters by DIS.

Left blank (erase)	Clears current DIS keyboard entry and any resultant error message; AUTO MODE (automatic command processing) is also cleared.

KEYBOARD ENTRIES

BEGIN, pname, pfile.	Sets AUTO mode and calls CCL procedure pname from file pfile.
BKP,xxxxxx.	Breakpoints to address xxxxxx. Central processor execution begins at current value of P and stops when P = xxxxxx and DIS is the only PP active at user's control point.
BKPA, XXXXXX.	Breakpoints to address xxxxxx. Central processor execution begins at current value of P and stops when P = xxxxxx.
DCP.	Drops the central processor and siplays the exchange package on the B display.
DIS.	Reloads main DIS overlay.
DROP.	Drops DIS; does not drop the job if there are commands remaining in the buffer (unless the error flag is set).
ELS.ccc...ccc.	Enters command ccc...ccc in the command buffer after the last command, if there is space.
ENAi,xxxxxx.	Sets register Ai = xxxxxx in the exchange package area.
ENBi,xxxxxx.	Sets register Bi = xxxxxx in the exchange package area.
ENEM,m.	Sets CPU program exit mode to m ($0 \leq m \leq 7$).
ENFL,xxxxxx.	Sets central memory FL = xxxxxx. xxxxxx $\geq$ 10000_8 if user EM is assigned.
ENFLE, xxxx.	Sets EM field length (FLE) to xxxx0000. If xxx=0, (set by ENFL) must be 10000_8.

KEYBOARD ENTRIES (cont.)

ENP,xxxxxx.	Sets P = xxxxxx (next instruction address).
ENPR,xx.	Sets job priority to xx ($2 \leq xx \leq 70_8$).
ENS.ccc...ccc.	Allows entry of command ccc...ccc as the next unprocessed statement in the command buffer. Command can then be processed using RNS, RSS or DROP.
ENTER./cccccc./dddddd./	Allows entry of command cccccc and dddddd from the keyboard and sets AUTO mode.
ENTL,xxxxx.	Sets the job time limit to xxxxx. 77777_8 is infinite.
ENXi,xxxxx xxxxx xxxxx xxxxx xxxxx.	Sets register Xi = xxxxx xxxxx xxxxx xxxxx xxxxx in the exchange package area.
ENXi, Lzzz...zzz.	Sets register Xi to zzz...zzz, left-justified.
ENXi,Dccc...ccc.	Sets register Xi to ccc...ccc display code characters.
ENXI,b,zzzz.	Sets byte b of register Xi to zzzz.
ERR.	Sets forced error flag, terminates program execution, and clears AUTO mode if set. (Stops programs that won't quit - use caution.)
GO.	Restarts a program which has paused.
HOLD.	DIS relinquishes the display console, but the job is held at the present status.
M.ccc...ccc.	Enters ccc...ccc as a CPU program command. Data is stored at RA + CCDR.
N.ccc...ccc.	Sets DIRECT CPU INPUT Mode. Characters entered from the keyboard are passed one character at a time, right-justified, directly into central memory at RA + CCDR.

KEYBOARD ENTRIES (cont.)

OFFSWx.	Turns off sense switch x for the job (1-6).
ONSWx.	Turns on sense switch x for the job (1-6).
026.	Call 026 file editor to the control point.
RCP.	Requests central processor. Depending on job priority, execution begins at the address specified by the P register for a job suspended by a DCP request.
RCS.	Sets AUTO mode and initiaties automatic control statement processing. All succeeding commands are read form the command buffer and processed automatically until an SCS command or an error is encountered or until job completion.
RNS.	Reads and processes the next control statment in the DIS command buffer.
ROLLOUT.	Allows the job to roll out.
ROLLOUT,xxxx.	Places job in the rollout queue for xxxx job scheduler delay intervals; job is automatically rolled back in after this period of time.
RSS.	Reads the next command and stops prior to CPU execution. This is used to initiate breakpointing of a program.
RSS,ccc...ccc.	Reads command ccc...ccc and stops before execution. Command buffer is not cleared.
SCS.	Clears AUTO Mode and stops automatic command processing.
T,xxxxxx.	Changes the T display to start at address xxxxxx.
U,xxxxxx.	Changes the U display to start at address xxxxxx.

KEYBOARD ENTRIES (cont.)

UCC = c.	Sets the uppercase character to c. Command does not terminate with a period.
V,xxxxxx.	Changes the V display to start at address xxxxxx.
X.ccc...ccc.	Processes ccc...ccc as the next command.
* xxx.	If an asterisk is followed by a blank and xxx is encountered during automatic command processing, xxx is interpreted as a direct DIS command rather than a command. Using this feature, it's possible to set up procedure files that use DIS to breakpoint a program to a desired stopping point.
xxxx.	xxxx is processed as a command if it is not a recognizable DIS command.
SUI,userindex.	Allows access to a user index above 377700_8. This command is not accepted by a secured system.

MEMORY ENTRY COMMANDS

- Commands are used in conjunction with C, D, F, G, and M memory displays.
- 12-bit bytes, 15-bit parcels, 30-bit parcels or 60-bits can be changed.
- Bytes are numbered 0 through 4 from left to right.
- Address and contents are right-justified wsith leading zero fill. Leading zeros may be omitted.
- On a secured system no memory entry commands are allowed unless the security UNLOCK status is set. The memory display shows the message.

  ****SECURED AREA****

MEMORY ENTRY COMMANDS

addr,cont. or addr+cont.	Changes the contents of memory location ADDR to cont. The second form does the same, but leaves the address at addr+1 allowing immediate entry for the next memory location.
addr,b,cont. or addr+b,cont.	Changes the contents of byte b at memory location addr to cont.
addr,Dcont. or addr+Dcont.	Changes the contents of memory location addr to display code characters cont (left-justified and zero filled).
addr,Lcont. or addr+Lcont.	Changes the contents of memory location addr, left-justified to cont.
addr,In,cont. or addr+In,cont.	changes the contents of instruction n (Ø through 3 from left to right) at memory location addr to cont; cont may be a 15 or 3Ø bit instruction.
Eaddr,cont. or Eaddr+cont.	Changes the contents of extended memory location addr to cont.
Eaddr,b,cont. or Eaddr+b,cont.	Changes the contents of byte b at extended memory location addr to cont.
Eaddr,Dcont. or Eaddr+Dcont.	Changes the cotnents of extended memory location ADDR to display code characters cont (left-justified and zero-filled).

LESSON 17

026 CONSOLE TEXT EDITOR

LESSON 17

026 CONSOLE TEXT EDITOR

Lesson Preface:

This lesson describes the 026 file editor. Topics covered include the following: first character entries, system commands, file commands, line entry and data move commands, display, tab and tab control commands, line record search commands, replace commands, miscellaneous commands, and special characters.

Objectives:

Upon completion of this lesson, the student should be able to:

- Create a file
- Modify that file
- Search for character strings within the file
- Display all or portions of that file

Reference:

- NOS System Programmers Instant - Pub. No. 60459370

FILE EDITOR (026) COMMANDS

026 DESCRIPTION

026 enables the user to create or edit a file from the console. A central memory buffer is used to store and edit the display code lines before writing the file. Like DSD, 026 is interpretive.

- Special first character entries
- Messages
- System commands
- File commands
- Line entry and data move
- Display, tab, scan control commands
- Line record search
- Replace commands
- Miscellaneous commands

NOTE: Use 026 sparingly as it does not make the best use of system resources. 026 requires a dedicated peripheral processor and control point.

SPECIAL FIRST CHARACTER ENTRIES

Ø	Sets insert at first line.
1	Sets insert at fourth line on screen.
2	Sets insert at eighth line on screen.
3	Sets insert at twelfth line on screen.
4	Sets insert at sixteenth line on screen.
5	Sets insert at twentieth line on screen.
6	Sets insert at twenty-fourth line on screen.
7	Sets insert at thirty-second line on screen.
8	Sets insert 8 at insert line.
9	Sets insert 9 at insert line.
+	Displays next page.
-	Backs up 18 lines or to start of buffer.
*	Holds display and returns control to DSD. When * is entered under DSD, control returns to Ø26.
/	Starts or stops roll.
(	Advances insert by one line.
)	Decrements insert by one line.
=	Clears insert flag.

ENTRIES (cont.)

'	Finds insert line and starts display at insert marker.
.	Deletes the line following the insert line.
CR	Sets REPEAT ENTRY flag.
space	Sets the characters P. into buffer.
Tab (right blank)	Spaces to next tab position when in insert mode.

SYSTEM COMMANDS

DIS. Writes the current buffer, rewinds the file, and transfers control back to DIS. See XDIS below. Caution - data following the current buffer will be lost.

DROP. Writes the current buffer, rewinds the file, and transfers control back to DSD. See XDROP below. Caution - data following the current buffer will be lost.

ERR. Sets error flag.

GO. Clears pause flag.

HOLD. Releases display to DSD.

XDIS. Transfers control back to DIS. Buffer is not written and file is not rewound.

XDROP. Drops display unit; does not write file.

LINE ENTRY AND DATA MOVE

Command that reads a subsequent line for character merging (A., L., M., and N.) and saves that line in the DUP buffer. This line can be referenced at a later time with the D. command.

A.ccc...ccc.	Merges specified characters with the line following insert marker except for tabbed or spaced-over area up to carriage return.
C.ccc...ccc.	Enters specified characters into buffer; ccc...ccc. may consist of up to 90 characters.
COPY.	Copies data block starting at insert 8 and ending at insert 9 into block at insert marker.
DEL.	Deletes all lines after insert marker. If insert is not set, deletes all lines.
D,*.	Deletes block from insert 8 through insert 9.
D.ccc...ccc.	Merges line from DUP buffer with characters ccc...ccc of keyboard buffer. Tab rules for A. command apply.
E.ccc...ccc.	Merges characters ccc...ccc with remainder of characters in DUP buffer except for tabbed or spaced-over area.
L.ccc...ccc.	Merges characters ccc...ccc with remainder of line except for tabbed or spaced-over area.
M.ccc...ccc.	Merges characters ccc...ccc with remainder of following line.
MOVE.	Moves data starting at insert 8 and ending at insert 9 into block starting at insert marker.
N.ccc...ccc.	Merges characters ccc...ccc with following line except for tabbed area.
P.ccc...ccc.	Enters characters ccc...ccc into buffer (up to 96 characters). User can set data entry mode by typing P. or typing a space.

DISPLAY, TAB,

SCAN CONTROL COMMANDS

DFL.	Displays first line.
DLL.	Displays last part of file.
DS,nnn.	Start display at line nnn of file.
DS,	Count the number of lines from the start of the display up to the insert mark or EOI.
TAB,x,y,...,z	Sets tabs x, y,...,z. If x equals Ø, the command clears all tabs. Default is TAB,11,18,3Ø,4Ø,5Ø,6Ø,73,8Ø. Later, use right blank key to tab on CC545 consoles.
SCAN,x,y,...,z	Sets word scan to x,y,...,z. If x equals Ø, the command clears scan.

FILE COMMANDS

BKSP.lfn.	Backspaces file lfn one logical record. If lfn is missing, previously specified file is used.
BKSPRU,x.	Backspaces current file x physical record units.
BKSPRU.lfn.	Backspaces file lfn one PRU. If lfn is missing, previously specified file is used.
FILE.lfn.	Changes name of current file to lfn.
RC.lfn.	Reads compile file. Rewinds, reads, and rewinds lfn. If lfn is missing, previously specified file is used.
*READ.lfn.	Clears buffer and rewinds, reads, and rewinds lfn. If lfn is missing, previously specified file is used.
READI.lfn.	Skips to end-of-information, backspaces twice, and reads lfn. If lfn is missing, previously specified file is used.
READN.lfn.	Reads file lfn with no rewind. If lfn is missing, previously specified file is used; stops read on buffer full or end-of-record encountered.
READNS.lfn.	Reads file lfn nonstop with no rewind. If lfn is missing, previously specified file is used; stops read on buffer full or end-of-file encountered.
*RETURN.lfn.	Returns file lfn. If lfn is missing, previously specified file is returned to system.
REWIND.lfn.	Rewinds file lfn. If lfn is missing, previously specified file is used.

---

* Most commonly used by operator.

** May want to use the repeat entry if searching through a file with many records.

FILE COMMANDS (cont.)

*RFR.lfn.	Clears buffer and rewinds and reads file lfn. If lfn is missing, previously specified file is used. (Reads first record.)
*RI.lfn.	Rewinds, reads, and rewinds file lfn. If lfn is missing, file INPUT is read. (Read INPUT.)
RLR.lfn	Clears buffer and reads last record on file lfn. If lfn is missing, previously specified file is used. (Read last record.)
*RNR.lfn.	Clears and reads next record on file lfn. If lfn is missing, previously specified file is used. (Reads next record.)
*RO.lfn.	Clears buffer and reads next record on file lfn. If lfn is missing, previously specified file is used. (Reads next record.)
RPR.lfn. **	Reads previous record from file lfn (that is, backspaces twice and reads).
SKIPEI.lfn.	Skips to end-of-information on lfn. If lfn is missing, previously specified file is used.
UNLOAD.lfn.	Unloads file specified by lfn. If lfn is missing, previously specified file is unloaded.

---

* Most commonly used by operator.

** May want to use the repeat entry if searching through a file with many records.

FILE COMMANDS (cont.)

WRITE.lfn.	Writes buffer on file lfn. If lfn is missing, previously specified file is used.
WRITEF.lfn.	Writes buffer on file lfn and places an EOF mark after the data written. If lfn is missing, previously specified file is used.
WRITEW.lfn.	Writes data from start of buffer up to insert line on file lfn. If lfn is missing, previously specified file is used.

---

* Commands more frequently used by operator.

** For these commands, if no file was previously specified, INPUT is used.

LINE, RECORD SEARCH COMMANDS

F.ccc...ccc.	Searches for matching field in line. Search is end-around.
S.ccc...ccc.	Starting with the first line displayed, searches for a line beginning with the characters ccc...ccc. Search is end-around.
GET,lfn.rname	Searches file lfn for record rname. If lfn is missing previously specified file is used.
GET.rname	Searches current file for record name.
GETR,lfn.rname	Reads random file lfn for TEXT record rname. If lfn is missing, previously specified file is used.
GETR.rname	Gets random record rname from current file. If a record of that name and type TEXT exists, reads that record.
GTR,lfn.rname	Reads random file lfn for record rname. If lfn is missing, previously specified file is used.
GTR.rname	Gets random record rname from current file. If a record of that name and type TEXT exists, reads that record; otherwise, reads record rname of any type.
LIST.	Lists directory of current file.
LIST, lfn.	Lists directory of file lfn. If lfn is missing, previously specified file is used.

REPLACE COMMANDS

RC,x,c.	Replaces character x of the line following insert marker with character c (extend line if necessary).
RM/ aaa...aaa/ next line	Replaces multiple; works the same way as RS command, but this command does not advance to next line. (REPEAT ENTRY does not have to be set.) The / can be any delimiting character.
RS/ aaa...aaa/ bbb...bbb/	Replaces character string aaa...aaa from the following line with character string bbb...bbb. The / can be any delimiting character.
R,x./ aaa...aaa/ bbb...bbb/	Replaces character string aaa...aaa fromt he following line starting with character position x with character string bbb...bbb. The / can be any delimiting character.

ENFL. Sets field length to buffer size plus 1000_8.

ENFL,xxxxx. Sets field length to $xxxxx_8$.

UCC=c Sets uppercase control character to c. If c is missing, clears the uppercase control character. To enter a character which has been previously specified as the uppercase control character, enter that character twice. See table of upper case characters on the following page. For example, to enter $:

```
UCC = Z.
      ZS
```

RWRITE. Rewrite record.

CAUTION:

1. Number of PRUs may not change. Rewrite not allowed if condition exists.

2. An ** will appear to the right of the *RS=* field when a no rewrite condition exists.

3. Rewrite to another file may produce unpredictable results.

SP. Toggle the option of clearing special characters from a file before displaying it. Clearing special characters will cause the console screen to flicker when displaying large files, or displaying files containing many special characters.

UPPER CASE CONTROL CHARACTER SET

To enter:	Enter uppercase control character and:
$	S
≡	Ø
[	1
]	2
%	3
≠	4
->	5
∨	6
^	7
↑	Q
↓	W
<	E
>	R
≤	T
≥	Y
∨	U
;	I
●	=
^	A
<	(
>	)
≤	+
≥	-
;	,
:	Z

LABORATORY 5

(OPTIONAL)

1. Use DIS and 026 to create, modify and print a file.

2. Backup all files on a logical disk.

3. Display terminal status of all terminals under NAM.

4. Which RHF applications are active?

5. Practice entering memory changes under DIS (with Console locked).

GLOSSARY

GLOSSARY

Abort	To terminate a program, or job when an error condition exits.
Access level	A property of each file, job and equipment on a secured system that is used to indicate the sensitivity of information in the file or job, or the sensitivity of information that can be processed by the equipment. On a secured system, there are up to eight access levels of sensitivity. You are authorized to access some or all of those levels.
Account Dayfile	Provides a history of system usage necessary for accurate billing and system usage analysis.
Address	The location of a word in memory.
AFD	The location of a word in memory.
ANSI	American National Standards Institute.
APRDECK	Auxillary mass storage parameter deck.
ACN	Application Connection Number - A number assigned by the Communications Supervisor program to identify a particular logical connection within an application.
Archive Files	A dump of permanent files to tape to protect them from loss due to device failure.
ASCII	American National Standard Code for Information Interchange.
Auto Recall	The act of program releasing control of the CPU until a requested function is complete.
Auxiliary Device	Mass Storage device that is not part of a permanent file family.

BIO	Central site batch I/O.
Bit	Binary digit, either a 1 or 0.
Breakpoint	A designated location in a program where, if reached during program execution, a break or suspension in execution occurs.
Buffer	An intermediate storage area.
Byte	A group of 12 bits.
Cache	A high speed memory that resides in the central processor.
Catalog	The list of names of files belonging to a particular user.
Catalog (CIR) - Image Record	A record written at the beginning of the archive file on which the permanent files are dumped for each incremental dump. When a file is loaded, this CIR information is placed in the permanent file catalog of the device being loaded.
CCL	Cyber Control Language.
CCP	Communications Control Program. A portion of the network software that resides in a 255 x series NPU.
Central Memory (CM)	The main storage device whose storage cells (words) can be addressed by a computer program and from which instructions and data can be loaded directly into registers from which the instructions can be executed or the data manipulated.
Central Processing Unit (CPU)	The high speed arithmetic unit that performs various instructions needed to execute programs.
Checkpoint	The process of writing a copy of your job's central memory, the system information used for job control, and the names and contents of all assigned files that are identified in a CHECKPT request.

CLA	Communication Line Adapter - Hardware that provides the interface between NPUs and modems.
CMRDECK	The central memory resident deck.
CTI	Common Testing and Initialization - Common deadstart process that resides on the deadstart file and the maintenance system library.
Communication Line	A complete communication circuit between a terminal and its network processing unit (NPU).
Communication Network	The portion of the total network comprising the linked network processing units. It excludes the host computer and the terminals.
Comunications Supervisor (CS)	A portion of the network software which coordinates the network - oriented activities of the host computer and of the lines and terminals logically linked to it.
Connection Number	A number assigned to an IAF terminal when it logs in and an entry is made for the job in the executing job table (EJT).
Connection Status	A job attribute kept in the job's EJT entry. It is used to determine the job's relationship with IAF.
Control Point	The portion of central memory that is assigned to a job. When a job is allocated a portion of central memory, it becomes eligible for assignment to the central processor for execution.
Controlware	A special type of software that resides in a peripheral controller. The controlware defines the functional characteristics of the controller.
cpi	Characters per inch.
cps	Characters per second.
CSU	Cartridge storage unit.

DAT	Device access table. A table that contains the logical description of each mass storage device which is accessible by any machine in multimainframe complex.
Dayfile	A chronological file created during job execution which forms a permanent accounting and job history record.
DDP	Distributive Data Path.
Deadstart	The process of initializing the system.
Detached Job	An interactive service class job removed from control of the interactive subsysem. It may or may not continue to execute.
Device Mask	An 8-bit quantity that identifies the group of users who have the particular device as their master device.
DFD	Dayfile Dump. A dump of the system dayfile to a printer.
DFLIST	A utility that generates a printer listing of all permanent files created by the DFTERM utility.
DFTERM	A utility that terminates an active or an inactive dayfile and retains it as a direct access permanent file.
DIS (Job Display)	A system peripheral processor program similar to system display (DSD) that provides communication between a job in central memory and an operator, and permits the operator to control program execution through the console keyboard.
DOP	Diagnostic Operator. An NPU operator who resides at a terminal and has permission only to status and test the network.
DSD (System Display)	The operating system program that provides communication between the operator and the system. DSD is permanently assigned to peripheral processor 1.
EBCDIC	Extended Binary Coded Decimal Interchange Code.

ECS	Extended Core Storage - An extension to central memory which is physically located outside of the machine.
EDD	A utility that may run at deadstart time after a system malfunction has occurred. It generates the express deadstart dump file on tape.
EI	Environment interface.
EJT	A central memory resident table with entries for all executing jobs.
EJT Ordinal	An index into the EJT. It uniquely identifies an EJT entry.
ELD	Error Log Dump. A dump of the system error log to a printer.
EOI	End of information. The end of data on a file.
EQPDECK	Equipment description deck.
Equipment Access Levels	A range of access levels specified for each equipment on a secured system. In order for a file to be stored or output on a given equipment the file's access level must be within the equipment access levels for that equipment.
ESM	Extended Semiconductor Memory
EST	Equipment Status Table - A central memory resident table listing all defined equipments, parameters affecting their operation, and the status of the equipments.
EST Ordinal	A number designating position in the EST. Sometimes referred to as equipment number.
Family Device	A mass storage permanent file device associated with a specific system. A family may consist of 1 to 63 logical devices.
Family Ordinal (FO)	An index into the FOT. It is used to uniquely identify a family.
FAT	Fast attach table.

FET	File environment table.
Field Length	The area in central memory allocated to a particular job; the only part of central memory that a job can directly access.
Field Access Level	A property of each file on a secured system used to indicate the sensitivity of information contained on the file. A file is assigned the current job access level by default when it is created or stored; the file creator may specify any access level for that file that is within the set of access levels valid for the job, the system, the file creator, and the communication line to the host mainframe.
FNT	File name table. A system managed table that contains the local file name, the file type and other job control information. All active files have an FNT entry.
FOT	Family Ordinal Table - A central memory resident table used to map family names to family ordinals.
FSE	Full Screen Editor.
Full Dump	A dump to tape of all files in the system or those cataloged on a specific device.
GCR	Group-coded recording.
GE	Group encoded.
HIVS	Hardware Initialization and Verification Software - the software package that assists CTI during deadstart and provices deadstart confidence level testing (HIVS).
HVS	Hardware Verification Sequence - A subset of HIVS. It tests the ability of memory to hold patterns of data and execute instructions.
IAF	Interactive Facility - An application that provides a terminal operator with interactive processing capability.

Incremental Dump	A dump to tape of those permanent files modified after a specified date. Each incremental dump writes a catalog image record at the beginning of the archive file on which the permanent files are dumped.
Incremental Load	A load that builds up an accumulation of the most recently modified versions of the files extracted from the archive files for loading. A series of archive files is read in the reverse order of creation. The CIR is read and checked against the archive files. If a file matches an entry on the CIR, that file is a candidate for loading.
Input	Information flowing upline from terminal to host.
Input Queue	A set of input files waiting to be assigned to control points by the operating system.
I/O	Input/Output.
IOU	Input/Output Unit - A collection of all PPs, PP channels and related hardware.
Job	All activity associated with a terminal session from login to log off.
Job Access Level	On a secured sytem, each job has an access level. This is the default access level that is assigned to files that are created or stored in the job. A job's initial access level is the lower access level limit for the job. The job's access level is automatically raised to the access level of any file from which information is read. You can also change job access level.
Job Access Level Limits	An upper limit and lower limit that determine the range of access levels that are valid for a particular job on a secured system. All files used in a given job must have an access level within the job's access level limits.
JSN	Job Sequence Name - the unique, system defined name assigned to every executing job or queued file. It is a string of four alphabetic characters.

LCP	Local Configuration File - Any file that is currently associated with a job. Local files include all temporary files and attached direct access files.
LDLIST	A utility that generates a printer listing of queued files present on a dump tape produced by the QDUMP facility.
Load Point	A metallic strip marking the beginning of the recording portion of a magnetic tape. Data, including labels, is written after the load point.
LID	Logical Identifier - A three character alphanumeric string used to identify a mainfram in a loosley coupled network.
LCN	Loosely Coupled Network - A network of physically connected computer systems.
MAG	Magnetic tape subsystem.
Mass Storage	An extended memory or disk unit which has defined logical attributes such as family, file residency, etc.
Master Device	A mass storage device that contains your permanenmt file catalog entries; all your indirect access files; and all, part or none of your direct access files.
MMF	Multimainframe.
MSL	Maintenance software library.
MST	Mass storage table. A table that contains an entry for each logical device in the configuration of mass storage devices.
MST	Mass Storage Test.
MUX	Multiplexor.
NAD	Network Access Device - The primary element in a loosley coupled network.
NAM	Network Access Method - A software package that provides a generalized method of using a communications network.

NCF	Network configuration file. A network definition file in the host computer, containing information on the network elements and permissable linkages between them.
NOS	Network Operating Systems.
NPU	Network Processing Unit - The collection of hardware and software that switches, buffers, and transmits data between terminals and host computers.
NS	Network Supervisors - A portion of the network software, written as a NAM application program. NS coordinates all of the NPUs in the communication network.
NVF	Network Validation Facility - A portion of the network software, written as a NAM application program. NVF performs all terminal login validation processing and supports login dialog with terminal user.
NOP	Network Operation - The operator who, through a terminal, controls network elements.
Origin Type	A job attribute that indicates how a job entered the system.
Output	The information flowing downline from host to terminal.
PF	Preserved file; permanent file. A mass storage file that is cataloged by the system so that its location and identification are always known to the system.
PFATC	A utility that produces a cataloged directory of file information derived from an archive file previously created by the PPFDUMP utility.
PFCAT	A utility that produces a catloged directory of file information derived from catalog tracks on a master device.
PFCOPY	A utility that extracts files from an archive file and copies them to one or more files at a control point.

PFDUMP	A utility that dumps permanent files to an archive file. Dumps can be reloaded by the PFLOAD utility and can be accessed by the PFATC and PFCOPY utilities for cataloging and copying.
PFLOAD	A utility that loads archived files produced by the PFDUMP utility back into the permanent file system.
PFS	Permanent file supervisor. the PFS processes parameters in utility command and loads the correct overlays.
PP	Peripheral Processor - the hardware unit within the host computer that performs physical input and output through the data channels.
Programmable Format Control (PFC)	Spacing and format control for 580 line printers provided by the use of software and a microprocessor instead of a carriage control format tape.
PRU	Physical Record Unit - 64 words or 640 characters.
QALTER	A utility that displays, lists, and/or alters routing and other information about activie queued files.
QDUMP	A utility that dumps selected queued files from a single device, a family of devices, or all devices on the sytem.
QFT	Queued File Table - A central memory resident table containing an entry for all active input and output queue files.
QFTLIST	A utility that displays and/or lists routing and other information about active queued files.
QLIST	A utility that lists inactive queued files, which may include all inactive queued files in the system or a selected subset.
QLOAD	A utility that processes the dump file generated by QDUMP.
QMOVE	A utility that moves queued files from one mass storage device to another.

QREC	A utility that deactivates or activates selected queued files and purges selected inactive queued files.
RBF	Remote Batch Facility.
RDF	Remote Diagnostic Facility.
Recall	The state of a program when it has released control of the CPU until a fixed time has elapsed (periodic recall) or until a requested function is completed (auto recall). Recall is a system action request as well as an optional parameter of some file action requests.
UEM	Unified Extended Memory